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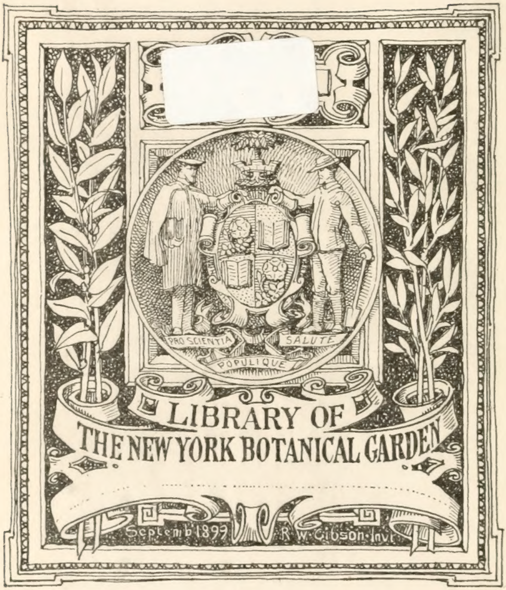
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FOURTEENTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

Massachusetts Board of Agriculture,

WITH

AN APPENDIX

CONTAINING AN ABSTRACT OF THE

FINANCES OF THE COUNTY SOCIETIES,

FOR

1866.

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STATE BOARD OF AGRICULTURE.

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HIS EXCELLENCY ALEXANDER H. BULLOCK.
HIS HONOR WILLIAM CLAFLIN.
HON. OLIVER WARNER, *Secretary of the Commonwealth.*
PAUL A. CHADBOURNE, *Pres. Mass. Agricultural College.*

APPOINTED BY THE GOVERNOR AND COUNCIL.

	Term Expires.
WILLIAM S. CLARK, *of Amherst*,	1868
EPHRAIM W. BULL, *of Concord*,	1869
LOUIS AGASSIZ, *of Cambridge*,	1870

CHOSEN BY THE COUNTY SOCIETIES.

Massachusetts,	LEVERETT SALTONSTALL, of Newton,	1868
Essex,	GEORGE B. LORING, of Salem,	1869
Middlesex,	JOHN B. MOORE, of Concord,	1870
Middlesex North,	ASA CLEMENT, of Dracut,	1868
Middlesex South,	JOHN JOHNSON, JR., of Framingham,	1869
Worcester,	THOMAS W. WARD, of Shrewsbury,	1869
Worcester West,	COURTLAND SANDERSON, of Phillipston,	1869
Worcester North,	THOMAS BILLINGS, of Lunenburg,	1869
Worcester South,	NEWTON S. HUBBARD, of Brimfield,	1868
Worcester South-East,	WILLIAM KNOWLTON, of Upton,	1870
Hampshire, Franklin and Hampden,	H. S. PORTER, of Hatfield,	1870
Hampshire,	LEVI STOCKBRIDGE, of North Hadley,	1868
Highland,	MONROE F. WATKINS, of Hinsdale,	1869
Hampden,	WILLIAM BIRNIE, of Springfield,	1870
Hampden East,	H. S. WARD, of Monson,	1870
Franklin,	JOHN M. SMITH, of Sunderland,	1868
Berkshire,	ALEXANDER HYDE, of Lee,	1870
Hoosac Valley,	JOHN L. COLE, of Williamstown,	1870
Housatonic,	T. D. THATCHER, of Lee,	1870
Norfolk,	CHARLES C. SEWALL, of Medfield,	1868
Bristol,	AVERY P. SLADE, of Somerset,	1869
Bristol Central,	NATHAN DURFEE, of Fall River,	1870
Plymouth,	CHARLES G. DAVIS, of Plymouth,	1869
Barnstable,	GEORGE A. KING, of Barnstable,	1868
Nantucket,	JAMES THOMPSON, of Nantucket,	1869
Martha's Vineyard,	DANIEL A. CLEAVELAND, of Tisbury,	1868

CHARLES L. FLINT, *Secretary.*

FOURTEENTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

BOARD OF AGRICULTURE.

To the Senate and House of Representatives of the Commonwealth of Massachusetts.

Another year has come and gone. Taking the State over, to the farming as well as to other industrial interests, it has been marked by a reasonable degree of prosperity. The price of farm labor has increased about sixty per cent. since the outbreak of the rebellion, while the cost of living has perhaps advanced to a much larger extent; but the prices of farm produce, though considerably higher than they were five years ago, have not, probably, been enhanced in the same ratio. The season has been in the main propitious, and, with few exceptions, the labors of the husbandman have been rewarded by a generous harvest, though the effects of the terrible droughts of the two preceding years have been perceptible in the reduced crops of fruit.

Upon the whole, therefore, we may congratulate ourselves upon our well-earned success in the practical labors of the farm and the garden. We have, moreover, been exempt from the disasters which have fallen heavily upon the agricultural interests of some other countries. We may reasonably entertain the hope that after a long series of well-meant and well-directed efforts, that contagious disease among cattle, known as pleuro-pneumonia, has been eradicated; while the sad experience of Great Britain in combating a somewhat analogous disease, the rinderpest or cattle plague, which has carried off more than two hundred thousand of the finest animals, has become sufficiently well known to confirm the wisdom and sound judgment of our own State authorities in the course adopted to prevent the introduction and spread of contagious diseases among our stock.

It is possible that in the early stages of our efforts to arrest the progress of the pleuro-pneumonia, when the disease was less understood than it is now, a somewhat larger number of cattle were destroyed than was absolutely necessary to secure the object in view; but no one can be so short-sighted as not to admit that it was better to err on the side of safety than to run the risk of incurring the losses which would inevitably have followed neglect; for we know now that every conceivable expedient was adopted by the English government to avoid the harsh necessity of a resort to the "stamping-out process," and that it was compelled to come to it at last, and to admit that it was the only effectual means of avoiding a far more terrible disaster, the losses in two years being about twenty millions of dollars.

By a reference to the following Report of the Massachusetts Commissioners on Contagious Diseases among Cattle, it will be seen that the aggregate cost to the State of extirpating the disease from our herds has been less than seventy thousand dollars, an amount which must appear trifling when compared with the results attained, and the exemption secured, by the efficient efforts of the State Board of Agriculture, and the too little appreciated labors of the Cattle Commissioners. This gives a cost to each inhabitant of the State of *six cents* for the seven years' operations, while to each poll tax-payer it was less than twenty-two cents, or about four cents a year.

To the Honorable Senate and House of Representatives of the Commonwealth of Massachusetts.

The Commissioners on Contagious Diseases among Cattle, in submitting their Report, congratulate the people of the Commonwealth upon the *probable* extinction of the disease, (no case having come to their knowledge since October, 1865,) which but a few years since threatened to be of so serious a character, viz., *pleuro-pneumonia.*

The Commissioners have been called to several towns during the past year to examine diseased animals, yet not a case of contagious pleuro-pneumonia has been found.

A concise history of the disease from its first appearance in Mr. Chenery's herd in Belmont to the present time, is deemed of sufficient importance to warrant its insertion in this Report.

In the latter part of May, 1859, four cattle arrived from Holland and were taken to the farm of Mr. Chenery. Two of them were sick, and in a few days died. Another soon after sickened and died. At the time of the death of the third, three calves were sold to go to North Brookfield, one of which was taken to the herd of a dealer for treatment, being sick. The dealer, trading in cattle, as usual, soon spread the disease far and wide.

In the following April an Act was passed "to provide for the extirpation of the disease called pleuro-pneumonia among cattle," which gave the commissioners power to cause to be killed all cattle in herds where the disease was known or suspected to exist. The disease had, at the time of the passage of the Act, been extensively scattered, and in a short time the appropriation ($10,000,) was absorbed. A larger number of cattle having been exposed than was at first estimated, an extra session of the legislature was called to revise the law, and to provide the means of executing it. A new law was enacted, and received the sanction of the executive on the 12th of June.

No new outbreak of the disease occurred during that year, nor in that locality, as far as is known, to the present time. The number of cattle killed was nine hundred and thirty-two.

For more than a year nothing was heard of pleuro-pneumonia. In fact, those most directly interested were confident that the disease was extirpated. Early in the following winter, however, it was reported that it existed in Milton, Dorchester and Quincy.

A board of commissioners was appointed, who, upon investigation, found the report to be true. A pair of cattle was purchased at Brighton, which were taken to Quincy, and both died. No further history of them could be learned, as it was impossible to identify them; but the spread of the disease could in every instance be traced to contact with the animals in the herd in which they were at the time of their death, as shown in the report of that year. The number killed during the year was one hundred and fifty-four.

For several months the commissioners felt confident that the disease was eradicated. In February, 1863, the commissioners were called to examine sick cattle in the north part of Waltham

—also in Lexington. It proved to be pleuro-pneumonia, and its origin was directly traced to a dealer, and from the sale of cattle by him, to eight different herds. The appropriation ($1,000,) was soon exhausted, consequently the commissioners resigned.

The selectmen of several towns were called upon to execute the law, which they (some of them at least,) reluctantly did, yet the disease still prevailed. Accordingly the present board of Commissioners was appointed in April, 1864.

It was found that several herds were affected, and that the origin of the disease was in Lexington or that immediate vicinity. Seventy-four cattle were killed during the year.

In 1865 but three herds were found affected with the disease, from which four animals were killed.

The Legislature at its last session, in a proviso to the Resolve allowing the sum of twenty thousand dollars to the use of the Commissioners, require them to make investigation and report upon the curability of the disease.

No cases of the disease having come before the board the past year, they were of course unable to comply with the request, and can only refer, for information on this subject, to the report of last year, on the experiments made by the Commissioners during the years of 1864 and 1865.

The uniform course of the present board has been to isolate all herds they have found affected with the disease, and such other cattle as had in any way been exposed to diseased herds, to kill such as they were satisfied had the disease to that extent as to make them useless to the owner, and, *in but few instances*, only such. The result of our action contrasts favorably with that of Great Britain in the management heretofore of contagious diseases among cattle.

In Great Britain, during the past two years, public attention has been diverted from *pleuro-pneumonia* to the more terrible disease, *rinderpest*.

We here quote from Prof. McCall's introductory lecture before the class of veterinary students, November 6th of the present year, at Glasgow, Scotland, to show that *pleuro-pneumonia* is still making its ravages among the cattle of that country:—

> "For upwards of twenty years this country has annually lost thousands of cattle from one contagious disease alone, viz., *pleuro-pneumonia*, and at the present moment it is busy among our herds. One gentleman

present has lost twenty-two out of a herd of thirty-five; and a few weeks ago I was consulted by a farmer who had lost twelve out of twenty, and now the disease has appeared among his young stock. The number of deaths in these instances is appalling, and the loss, directly and indirectly, cannot be estimated at less than £900 or £1,000.

"The *plague* has drained the pockets of farmers and dairymen of thousands sterling; but thank Providence we are now free of the disease in this country. *Pleuro-pneumonia* has drained our pockets of millions of pounds, and she is still in our midst, the great enemy of our stock. * * * * * Use the means I have indicated, and the means which the *plague* has taught us to be of benefit in controlling contagious diseases, and if the contagious pleuro-pneumonia of cattle now decimating our stock is not thereby extinguished—'stamped out'—its operations will be so curtailed, that the losses resulting to stockholders from the presence of the disease will sit light upon them."

Prof. Simonds, in his introductory address, delivered at the Veterinary College in London, in October, says:—

"From this time the disease called *rinderpest* spread in all directions, the attacks gradually rising until they reached, in the week ending February 17th, 1866, the alarming number of 15,706. The first order in council was dated July 14th, 1865, and from that period until now, order has succeeded order, with more or less influence in checking the progress of the malady, and providing for the altered state of things arising out of its existence.

"The passage of the Cattle Plague Act was, however, the real cause of the diminution of the cases which has since taken place, and which emboldens us to hope that ere long the disease will be entirely exterminated. For the first time in the history of the visitation, the attacks were returned as under 100 for the week ending September 1st, 99 being the exact number reported by the inspectors." * * * * *

He quotes from the official returns the amount of loss which England herself, apart from other parts of Great Britain, has sustained.

"The total attacks are returned as 198,406. The animals killed, (diseased,) amount to 77,508; those which died to 90,415; the recovered to 21,589; and the unaccounted for to 8,894. Besides which, no less than 38,356 have been slaughtered healthy, to prevent the spread of the malady. These figures are truly formidable; but they fail to show a tithe part of the distress and ruin which has been brought on hundreds of industrious farmers and cattle-owners by this dreadful visitation."

In speaking of Scotland, he says:—

> "It appears from the official returns that the attacks in Scotland amount to 46,861, being 4.841 per cent. of the entire stock of the country.
>
> "In Ireland but fifty cattle were exposed to the disease; twenty-nine were attacked and either died or were killed, and twenty-one were slaughtered healthy.
>
> "Nothing can show more clearly the propriety of the 'stamping-out process' than this result. In it we have a parallel with what took place in France, where only 43 animals, healthy and diseased, were sacrificed to the pole-axe, the country being thereby freed from the plague."

The Cattle Plague Act alluded to above, resembles the law passed by the legislature of Massachusetts at the extra session, in its general features; and the course adopted by the authorities of Great Britain, in relation to rinderpest, is similar to that taken by the present board of Commissioners in Massachusetts in relation to *pleuro-pneumonia.*

Prof. Simonds further says that a focus of the disease still exists; consequently the law passed by Congress, preventing the landing of any cattle from foreign seaports, should be continued in force.

We append to this Report a statement of the entire expenditure by the State of Massachusetts for the extirpation of the disease since its commencement in 1860, obtained from the treasurer's books, which is $67,511.08. In addition to this amount, the several towns where the disease has been found have paid one-fifth of the cost of isolation, and of the appraised value of all the cattle killed, amounting to a sum which we estimate at $10,000. (There is no printed report of the number of cattle killed by order of the selectmen of towns in 1863.)

The amount paid from the treasury on account of pleuro-pneumonia is as follows:—

In 1860,	$28,733 21	In 1865,	$5,622 84
1861,	14,118 43	1866,	386 35
1862,	4,525 86		
1863,	6,657 32		$67,511 08
1864,	7,467 07		

E. F. THAYER,
CHAS. P. PRESTON,
F. D. LINCOLN,
Commissioners.

DECEMBER 28, 1866.

PUBLIC MEETING OF THE BOARD

AT SALEM.

The usual country meeting of the State Board of Agriculture for lectures and discussions, was held at Lyceum Hall, Salem, commencing on Tuesday, December 11, at 12 o'clock, the place of meeting having been changed from Concord by the Committee on Meetings. The Board was called to order by Dr. LORING, Chairman of the Committee, when Hon. LEVI STOCKBRIDGE, of Hadley, was requested to preside, and accordingly took the chair.

The first business in order was a Lecture on

THE CONNECTION OF THE STATE BOARD OF AGRICULTURE WITH THE MASSACHUSETTS AGRICULTURAL COLLEGE.

BY DR. GEORGE B. LORING.

GENTLEMEN: — Agricultural education is yet in its infancy. The business of farming has, it is true, attracted the attention of the most enterprising and thoughtful in all ages; the statesman and political economist have recognized its importance to society and to the state; science has explored its mysteries; to the wealthy and ruling classes it has furnished opportunities for gratifying the finest tastes and adorning the earth; to the laborer it has always brought the necessaries of life; it has never yet failed; and it is as diverse in all its processes as are the soils, and climates, and markets, and social and civil organizations, on the face of the globe. Every prosperous and cultivated people has an interest in agriculture. A State without a rural population is but half a State. A country without products from the land is no country at all. And whether we turn to the semi-barbarism of Asia, or to the half explored regions of Africa and the islands of the southern seas, or to the refinement and poverty of Europe, or to the social equality of our own land, we find everywhere an appeal to the earth by the devoted cultivator, and a liberal response to the call. Agriculture is as old as man, and as universal. And yet we search in vain for any system of agricultural education among ancient records; and we look in vain for any entirely successful system in modern times. The early books on agriculture are chiefly valuable as a history of the superstitions and popular delusions and daily tasks of the olden times; and the later books are an interesting record of the facts brought out by practical men, and of the efforts of science to classify those facts, and to draw from them positive rules of action. But we find no satisfactory system of education.

This is the more extraordinary, when we remember, how always and everywhere the mind of man has labored to throw light upon an occupation which is recognized as the fundamental art. Among the treatises on government and society which have been produced by the great intellects of every age, may be classed the works of those who have taught mankind how to divide, own and till their lands. And I have often thought that no library would be more interesting, curious and instructive, than one containing all the volumes written to enlighten the husbandman, from the days of Hesiod and Aristotle, down to Liebig's ingenious theories, and that modest effort entitled "Farming as it is."

In addition to these admirable endeavors of eloquent and careful authors to impart agricultural knowledge, many forms of associated instruction have been established from time to time. Early in the eighteenth century, about 1720, there were nearly thirty agricultural societies in France. Ere long attention was turned to the science of agriculture, which was publicly taught in the Swedish, Danish and German universities. And private fortunes were devoted to the endowment of special schools of agriculture. The patronage of government, too, has not been wanting. In Italy, in Sweden, in Denmark, in Switzerland, in France, in England, every branch of agriculture has been encouraged by the government; and "even Spain, naturally inactive on these occasions, in spite of all the prejudices of a bigoted religion, invited Linnæus, with the offer of a large pension, to superintend a college, founded for the sake of making new inquiries into the history of nature and the art of agriculture." And Bonaparte, in his liberal policy toward agriculture, greatly increased the number of societies, established professorships, botanical gardens, &c., all of which concurred to elevate the study of agriculture in the estimation of those capable of bringing to its aid the principles of the abstract sciences. In fact, the only obstacle in the way of a rapid advancement in agricultural information during the last century in Europe, was the indifference of the popular mind, and its devotion to tradition, rather than to the results of careful investigation. "Book-Farming" had no charms for the common people, who looked on with distrust and jealousy, while the educated explorer endeavored to elevate their calling, enlighten their minds, and relieve the heavy burdens of labor.

There is no doubt that the establishment of Boards of Agriculture is the most important step that has yet been taken in the work of agricultural improvement, and that the labor of Sir John Sinclair, as the founder of such organizations, entitles him to the respect and gratitude of all tillers of the soil. A century and a half before he began his work, Hartlibb, and more recently Lord Kames in the "Country Farmer," had pointed out the utility of a board of agriculture; but it was left to his zeal and untiring effort to call into life that valuable auxiliary to agricultural progress, and the board was created in 1793. To its establishment, more than to any other movement of that day, England is indebted for the present high and prosperous state of her agriculture. It brought men together from all parts of the kingdom, made them acquainted with each others' views, and with the modes of culture prevailing in sections of which they had previously been ignorant. Take away from our present knowledge of agriculture, or indeed of any other practical art of life, all that has been learned from the mere mental stimulus of associated effort, and the attrition of mind upon mind, and there would be a comparatively small amount left. It was through the encouragement of the board of agriculture chiefly that Sir Humphrey Davy was led to investigate the elements of the soil, and to apply the science of chemistry to the improvement of agriculture; and here begins, properly, the real progress of the art; for without a knowledge of the simple substances of nature, agriculture could not be expected to take the rank of a science. The lectures of Davy before the board of agriculture, from 1802 to 1812, mark an important epoch in the history of modern agriculture. The substance of these lectures was embodied in his "Elements of Agriculture," published in 1813, and translated into German in 1814, and into French in 1829. This work offered the very kind of information which Arthur Young declared to be the great want of the day. It opened to the reflecting farmer new and interesting views of the principles of fertility and vegetation. It explained the physiology of plants; it analyzed the manures best adapted to their growth; and contained careful experiments upon specific fertilizers. It was indeed the introduction of scientific agriculture, opening the path which has since been trod so zealously, and erecting a monument to the wisdom which guided the board of agriculture in its selection of the great philosopher as its guide in agricultural education.

After reviewing the various attempts made by Marshall, Young, Bakewell, Anderson, the Duke of Bedford, and other noblemen, in advancing the art, Dr. Dickson says: "But neither the distinguished example of the sovereign, the endeavors of provincial societies, nor the exertions of private individuals, with whatever zeal and attention they may be directed, are probably sufficient to extend the knowledge of husbandry to that degree which is necessary for its complete and radical improvement. This could only be fully accomplished by the powerful influence and expensive exertions of a national establishment instituted for the purpose. Such an institution has at last been brought forward and established by the intelligent and persevering efforts of Sir John Sinclair, to the honor of the country, the age, and the individual who suggested it. The institution of a board of agriculture and internal improvements has already contributed materially to the extension and advancement of the knowledge of rural affairs. The state of the art in the greatest part of the kingdom has been ascertained, a great variety of new and interesting facts and practices have been brought to view, and improvements in the instrumental and other parts suggested. Among these the elucidation of the principles and practice of draining or removing the injurious wetness of land, arising from springs and other causes, as laid down and explained by Mr. Elkington, is of great importance and deserving of notice, not only as the basis or foundation of many improvements in the art, but as leading to the convenient and easy application of water for irrigation and other purposes."

This board of agriculture, so well described by Dr. Dickson, and whose service has been so useful and important, is the foundation of that system which has been introduced into our own State, and whose business, as an organ of education, we have met to transact.

It will be observed that every mode of improving agriculture by process of mental discipline, has had immediate reference to the *practical business of the farm.* The most poetical and imaginative of agricultural writers have always kept the farm-yard and the furrow in view. The most elaborate scientific investigations into the nature of the soil, the qualities of plants, the structure of animals,—chemistry, botany, physiology,—have all been subjected to that hardest of all tests, the details of agricultural life. However broad may have been the policy, however large the design of those who, by school, and society, and volume, have endeavored to increase the wealth and power of the State, by draining its lands, and dividing its fields, and protecting its forests, and encouraging its productions, and introducing the mechanical improvements of the age, they have all been obliged to take their stand and apply their knowledge and their forces to an individual farm in order to test their value. And when a disciple of Liebig applies successfully the theory of his scientific master to a rood of land, Liebig's triumph is there. When our own industrious and untiring Agassiz finds the laws of reproduction, which he has laid down after long study in the closet, practically applied by the intelligent and enterprising farmer for the improvement of his flocks and herds, then it is that the philosophy of Agassiz plants its foot upon the earth and benefits mankind. The knowledge which science has already unfolded belongs to the farmer, if he will but accept and exercise it. And the best teacher of agriculture is he who can present this knowledge written out upon the fields and gardens, which his own intelligent skill has brought up to usefulness and beauty. The best agricultural college is that which sends forth from its halls a band of successful cultivators, admiring and believing in nature, because they are familiar with her laws. This may be called an industrial school, perhaps; and it may be deemed unworthy of the high position which Massachusetts should take as a fountain of the highest knowledge. But let such a college once be established here—a college in which the theory of the student will receive the stamp of its actual value—a college in which the experiment of the laboratory will be put to a final test—a college in which all the best culture of the schools will be so moulded and directed as to give us a cultivated population, devoted to the land, with an understanding of its mysteries, and devoted to social and civil life, with a proper and refined conception of their duties—give us a college like this, and Massachusetts will have accomplished an educational work, which will give her an influence wherever land is divided among freemen and cultivated by an intelligent yeomanry. Nearly half a century ago, one of the best observers, thinkers and writers on agricultural topics in this country, one of the earliest advocates of agricultural education, labored for an institution like this. I refer to Judge Buel, of Albany. In his correspondence I find the following: "I consider the plan suggested by the Albemarle Society as defective, inasmuch as it makes agriculture an *auxiliary* study. It ought to be the *principal*, and botany, chemistry, polite literature, &c., made subservient to this great study. The pupil should go to it with the express view of learning to be a farmer, and should be taught so much science, blended with experimental and practical knowledge, as should best promote this primary end. Of what vast importance would a well-conducted experimental farm connected with such an institution soon become to the agricultural interest, and to the Union at large."

I do not think that a practical agricultural college would be derogatory to the dignity of Massachusetts, or that it would belittle and cramp those engaged in the business of conducting it. He who will guide such an institution into successful operation need have no fear that his light will be "hid under a bushel;" his candle would flame from every housetop in the country, beneath whose shelter the farmer, and gardener, and lover of the land and animals, finds repose. To that altar all explorers might bring their gifts. The geologist with his strata and soils, the chemist with his laboratory and tests, the natural historian with the laws of the animal and vegetable kingdom written down in his scientific statute-book—all might find there a common hearthstone around which they might gather, and find a common object of interest—the subduing and utilizing the earth on which they have made their investigations. And if there are those who believe that the great minds of this and all time would find no home on such a spot, let them remember that for such a purpose as that to which this institution would be devoted, labored those wise and thoughtful statesmen and philanthropists, who, while they toiled for man's civil and social elevation, remembered that man is but Antæus, drawing strength from the earth on which he treads; let them remember that it has been found easier to organize churches and schools and found States, than it has been to construct a system of agriculture; let them remember that the division of landed estates and the modes of farming adopted by any people are as indicative of their social condition as their churches and school-houses—perhaps more so; and if they are citizens of Massachusetts, let them remember that around such an institution stands an intelligent, inquiring, investigating, free and equal, rural population, ready to seize and apply all the practical information which the profoundest student can offer for their benefit, and capable, moreover, of teaching, in some measure, those by whom they are to be taught.

I have said that every mode of improving agriculture by process of mental discipline has had immediate reference to the *practical business of the farm.* This is especially the case in Massachusetts. The board of agriculture organized by Sir John Sinclair was not more perfect in its design, than that established in this State in 1852, and has since been in successful operation. Every provision of the Acts defining the duties of this Board, and bestowing conditional bounties on agricultural societies, is marked by a thorough appreciation of the wants of the community, and a true understanding of the best means of acquiring and using agricultural knowledge. I think we cannot be too grateful to those men who formed these Acts. Bearing in mind that they provide for the intimate connection between the Board and the government of the Commonwealth, through the governor, lieutenant-governor and secretary of the Commonwealth, we should also remember how they require the utmost vigilance in observing and collecting all facts valuable to the farmer. The Board is a representative body—a collection of delegates—one from each agricultural society; and these societies are so organized as to include every farm and accommodate every farmer in the State. The Board is authorized, with its Secretary, to "investigate such subjects relating to agriculture in this State as they think proper;" and as if to fix definitely the nature of its duties, it is also empowered to "*hold in trust, and exercise control over donations or bequests made to them for promoting agricultural education.*" It is required to make a detailed report of its doings annually to the legislature; and the Secretary of the Board is authorized to "appoint one or more suitable agents to visit the towns in the State, under the direction of the Board, for the purpose of inquiring into the methods and wants of practical husbandry, ascertaining the adaptation of agricultural products to soil, climate and markets, encouraging the establishment of farmers' clubs, agricultural libraries and reading-rooms, and of disseminating useful information in agriculture by means of lectures and otherwise." From the above provisions of the Act establishing the Board, it is evident that its founders intended it as an educational system, obtaining information wherever it could be found, and sending it abroad throughout all the agricultural districts of the State. The power to hold property in trust for the benefit of agricultural education should not be forgotten. And the power granted to the Secretary to appoint "suitable agents," missionaries, as it were, to the societies and clubs and agricultural libraries, creates a system of investigation and teaching hardly equalled by the well-endowed organization of the board of education.

The encouragement which the State has given to agricultural societies by bounties, is coupled with a provision, which also shows how devoted to the work of "agricultural education" were the framers of this series of Acts, and how entirely they intended the board and the societies as institutions of agricultural learning. The section containing this provision I shall quote entire, for it seems to me that it has been somewhat overlooked by those who receive the liberal bounty of the State, and who should be willing to bestow an equivalent to that bounty. The section reads as follows:—

"SECTION 5. Every society shall annually, on or before the tenth day of December, make a full return of its doings, signed by its president and secretary, to the secretary of the board of agriculture, embracing a statement of the expenditure of all money, specifying the nature of the encouragement proposed by the society, the objects for which its premiums have been offered, and the persons to whom they have been awarded, and including all reports of committees and all statements of experiments and cultivation regarded by the president and secretary as worthy of publication; *and shall accompany the same with such general observations concerning the state of agriculture and manufactures in the State as it may deem important and useful.* The return, whether in printed or manuscript form, *shall be marked in such manner that those passages in the several reports and statements deemed by such officers most worthy of public notice, study and application, may be easily distinguished.*"

It is difficult to conceive a more excellent arrangement than is contained in the portions of these Acts which I have quoted. An appeal is made to an educated and industrious community of farmers to become at once teachers and learners. Had Arthur Young enjoyed the privileges which have been bestowed upon the Board of Agriculture and its Secretary in this Commonwealth, the agriculture of England might have been advanced a century through his instrumentality alone. Every experiment however small, every essay however humble, every investigator however rude and primitive his processes, receive direct encouragement from the State, and find listeners and learners in every farmhouse, where may also be found the experimenters and writers of the art.

The history of the Board and of the societies shows that their work has thus far been well done. If there was ever any doubt of the disposition and ability of the farmers of Massachusetts to acquire and impart information, that doubt should be removed by the series of volumes entitled the Agriculture of Massachusetts. Turn to the "Abstract of the Returns of the Agricultural Societies of Massachusetts" contained in those pages, and you will find a record of facts, figures, opinions, theories and laws upon almost every matter of interest to the farmer, a record drawn from the soil itself by the well-educated cultivator, or from the stalls and folds and pens of the successful managers of the domestic animals used upon our farms. Page after page presents to your consideration the refined sentiments, and generous speculations, and encouraging thoughts, not only of educated men who are called to address our societies at their annual exhibitions, but of those also, who, as practical farmers, ennoble their calling and add their daily contribution to the productions of the State. The literary work performed by the members of the Board, a voluntary and unremunerated act, without parallel in any other public service known to the State, contained in this Annual Report deserves more than a passing mention here, especially, lest, like so many unobtrusive charities, it be overlooked and forgotten.

In the year 1859 I find that the members of the Board furnished 182 pages, including their reports upon the societies; and the subjects treated were Manures, Pasture Lands, Cattle, Diseases of Vegetation, Fruit Culture, Root Crops, Market Days, and Agricultural Education.

In the year 1860 the members of the Board furnished 217 pages, and the subjects treated of were Sheep Husbandry, Diseases of Vegetation, Root Crops, Horses and Flowage.

In the year 1861 the members of the Board furnished 179 pages, and the subjects treated of were Diseases of Vegetation, Cattle Husbandry, Protection of Sheep and Lambs, Wastes of the Farm, and Wheat Culture.

In the year 1862 the members of the Board furnished 187 pages, and the subjects treated of were The Application of Manures, The Cultivation of Tobacco, The Arrangement of a Catalogue of Fruits adapted to Massachusetts, and Grape Culture.

In the year 1863 the members of the Board furnished 95 pages, including their discussions; and the subjects treated of were Agricultural Education, Grape Culture, The Growing of Meat, Preparation of Land for Crops, and The Cranberry.

In the year 1864 the members of the Board furnished 181 pages, and the subjects treated of were The Management of Farms, Agricultural Education, The Corn Crop, Grape Culture, Pasture-lands, Cattle Husbandry, Sheep Husbandry, Root Crops and Garden Vegetables, Planting Pines and other Trees, Farm Buildings, Fruit Cultivation, and Grapes.

In the year 1865 the members of the Board furnished 289 pages, and the subjects treated of were The Cattle of Massachusetts, Agriculture as an Employment, The Diseases of Cattle, Sheep Husbandry, Plants, Grape Culture, Manures, Drainage, Fruit Trees, Forest Trees, The Dairy, Farm Accounts, Seeds, and Surveys of several Counties in the State.

The members who contributed these pages to the State report specially, also, in some instances, appear as writers for the local societies. In the part which I have performed in this service myself, I have endeavored to discharge faithfully my duty as a member of the Board, working for the general interests of agriculture. Of my associates in the labor which I have just sketched to you, it is only necessary to give the names of Fisher, Felton, Lathrop, Bartlett, Wilder, Atwater, Sewall, Davis, Grinnell, Clark, Stockbridge, Bull, Stedman, Clement, Phinney, Agassiz, Chadbourne, Tidd, Perkins, Huntington, Thompson, Cleaveland, Moore, Fay and Saltonstall as the authors of the pages which I have enumerated, to give assurance that the Board of Agriculture has truly represented the farming interests of the State, and that its deliberations are entitled to respectful consideration. Add to what has already been enumerated as coming from delegates, societies, orators and others, the reports of the Secretary and his assistants, and you have an annual volume valuable and interesting, and enjoying a high reputation among all students of agriculture.

It is this Board, designed, as I have shown it to have been, for educational purposes, organized as it is by the connection of agricultural societies with the highest officers in the Commonwealth, laboring as it has done continually in the cause to which it is devoted,—it is this Board which, by the Act of May 26th, 1866, is constituted a board of overseers of the Massachusetts Agricultural College.

In what I have already said, I have endeavored to show the direction which intellectual efforts in every form have taken for the benefit of practical agriculture. I have traced the way from individual labors in the form of books from masterly hands up to that associated duty which has been so well discharged by boards of agriculture in every State where they have been founded. And I have pointed out how especially our own Board was originally organized for the purposes of agricultural education in the hands of practical teachers.

I consider that the CONNECTION OF THIS BOARD WITH THE AGRICULTURAL COLLEGE is a matter of the greatest importance to both institutions.

To the Board, which I think has richly earned this distinction by the services to which I have alluded, the connection is undoubtedly important. That the Board of Agriculture should have been made the trustees of the college by the Act of incorporation, there can now be but little doubt; and having been deprived of this opportunity for honor and usefulness, its elevation to the position of overseers is but an act of justice. The labor which it has hitherto performed, in spite of public indifference, and without that authority which an organized institution of learning always enjoys, may be largely increased in value by being connected with the recognized head of agricultural education in the State. The investigations which have been made by the Board, the essays which the members have published, the experiments which they have recorded, would have been laid before the public with much more effect, had they undergone the scrutiny of a scientific body laboring in the same cause. It is not difficult to see that the annual report of the Board may be raised above what it already is, if it shall be made the receptacle of the careful investigations carried on at an experimental farm connected with the college. Add to what we now have in the volume, the results of analysis and comparison made at the college under the eye of science, and what a flood of light might be poured upon the dark places through which we now grope. You will all agree with me, I am confident, that the character of our agricultural literature may be improved, and that any effort which will raise it to the standard of foreign writing on the same subjects should be speedily and energetically made. Is it too much to hope that our annual report may be made a model volume, by the stimulus and illumination which may come to it from an agricultural college?

These meetings for discussion, too, how might they be guided and improved by the instruction of those whose business it is to keep their minds prepared for the work of education. The success of a debate almost always depends upon the manner in which it is opened. Make it the duty of the professors and young men of the college to take part in these public assemblies, and you will find at once that their value and importance are largely increased—to ourselves as well as to the community.

And when we would apply that section of the Act incorporating the Board, which provides that the Secretary may appoint an agent "to visit the towns in the State, under the direction of the Board, for the purpose of inquiring into the methods and wants of practical husbandry," in what better way can this be done than by submitting section after section of this State, or county after county, to the careful exploration of the college, until its resources in soils, capacity for crops, in forests, in peat and minerals, in all productiveness, be thoroughly understood, and their value thoroughly appreciated? "County surveys" made in this way might be invaluable, and the Board might rank in this respect with any similar bureau in the Old World or the New, and Massachusetts take the lead in collecting and arranging the statistics of agriculture and natural resources—in which work the department of agriculture under the general government has so lamentably failed. The information which the Board has already collected is of great value. How much more important may it be made by being brought to the college, and thence diffused through lecture and publication.

It seems to me, moreover, that by the connection proposed, the Board of Agriculture may do much towards the support of the college. Representing, as the members of the Board do, every farm in the State, they enjoy an especial opportunity to bring the college under the notice of all farmers, and to enlist the sympathy of others who have acquired the power to own land and the taste to adorn and improve it, and who only ask for sufficient knowledge of its management to be able to develop all its capacity and beauty. Let us bind, then, the farm, the agricultural society, the board and the college, into one grand system of agricultural education, in which each may aid the others in performing well their part.

The liberality of the Commonwealth towards the Board of Agriculture and the societies is well known; and, while it is entitled to our deepest gratitude, it places us under the most sacred obligations to see that the bounty bestowed is turned to the best account. The annual expenditure of nearly forty thousand dollars upon societies and the Board, for the improvement and development of agriculture, and for the diffusion of agricultural knowledge, ought to be so directed as to produce the largest possible benefit. Elevate, for this purpose, the Secretary of the Board to the position of teacher, or lecturer, or professor in the college; plant our excellent agricultural museum at the college; connect the scientific investigations now made by employés of the Secretary of the Board with the college; call the board together annually, or oftener, within the walls of the college; provide that all State agricultural publications shall emanate from the college; and the money now expended upon the Board and its officers alone, would be devoted to the double purpose of sustaining and elevating the Board, and also of giving aid and encouragement to the college.

It should also be the duty and privilege of the Board to examine the students in the college, either by sub-committees or as a body, at the close of each term of the course, or at such times as the faculty might designate. Examinations of this description are common in other colleges; and nothing could be more appropriate than the plan I have proposed, when we consider the wide-spread interest in and knowledge of the college, which it would naturally create. It forms a part of that system of co-operation and support which I think is due from the agricultural community to an institution founded for their especial benefit. To encourage and strengthen the hands of the president and faculty, in their endeavors to establish a system of agricultural education, is a service to which the Board of Agriculture may well devote itself—a service which it can perform without interfering in any way with that part of the government of the college which belongs to the trustees; a service, which, if properly discharged, may stamp the college as an institution devoted to teaching the science and art of agriculture, and may develop a successful and useful mode of instructing our farmers, and of giving greater certainty to their business.

Having considered the advantages which the Board may derive from the proposed connection with the college, I now come to the benefits which would accrue to the college itself from such a connection.

I stated, in the commencement of my remarks, that agricultural education is yet in its infancy. And it is so. But while the application of science to the art of tilling the earth has attracted the attention of the best educators of the age, it has been determined, as a general rule, that devotion to matters of practical importance lies at the foundation of the best system of instruction in this branch of education. In the school founded by Fellenberg, at Hofwyl, in Switzerland, were combined: 1, a pattern farm; 2, an experimental farm; 3, a manufactory of agricultural implements; 4, a school of industry for the poor; 5, a boarding school; 6, an institute of agriculture, theoretical and practical. And so successful was this institution, that at one time its pupils were "employed at high salaries, in various parts of Europe, to superintend and direct the labors of agriculture. Dr. Bright, in his recent travels in Hungary, saw one of them who had the superintendence of an extensive estate which he visited, the products and revenues of which had been quadrupled in a short time by his judicious management. The same traveller enumerates eight schools, on the Hofwyl plan, which had been established by the government, or by individuals, in the Austrian States. In these the course of study generally lasts three years, in which time the pupils are instructed in natural philosophy, chemistry, natural history and veterinary science; while upon large experimental farms they are taught agriculture, the management of fruits and forest trees, and the care of cattle, sheep, swine and bees."

The Emperor Napoleon established a school at Alfort, where "all the branches of science connected with agriculture are taught. Chemistry, botany, the anatomy of cattle, farriery, with the mechanics, and as much of geology as is known, and farm work and domestic economy in every branch, and down to the smallest article, are there exhibited and explained." The effect of this school was to improve in many respects the agriculture of France, by introducing new and better modes of cultivation, machinery of various kinds, and by sending into the provinces scientific men, so educated that their science was made practically useful.

"At the school established by the Emperor of Prussia at Möglin, the value of the farm was increased, in twelve years, from 2,000 to 12,000 rix dollars. The branches taught in this school were mathematics, chemistry, geology, botany, veterinary science, entomology, &c. An experimental farm and a botanical garden were also connected with this establishment, as well as a repository and manufactory of agricultural implements."

I have enumerated these schools because I know that their results are such as must recommend them to the judgment of every successful and enlightened farmer. The well cultivated acres around a college building, and the success of those cultivators who have been taught on those acres and within the halls, are the testimony which will weigh upon the minds of an observing community.

In a community like ours there exists a necessity, it is true, for instruction in all those branches which constitute what we call a good education, as well as those which are immediately applicable to the business in hand. Algebra, geometry, trigonometry, mechanics and optics, engineering, astronomy, climatology, all belong to the course of study which should prepare every mind for the work of life. Of languages, French and German open rich stores to the agricultural reader. Of sciences, geology, chemistry, botany, anatomy, zoölogy, belong especially to the well-educated farmer—each one tending to throw light upon his profession. Beyond this is opened the great range of studies more particularly applicable; and we desire, by books and lectures, to secure all the knowledge possible upon landscape gardening, rural architecture, domestic animals, their increase, improvement, use, feeding, health and disease,—animal and vegetable physiology, the cultivation of plants, pomology, practical agriculture, &c. And still further on, a familiar knowledge of the processes of the farm should surmount the whole, and make the system complete. The association of the scholar with the fields, and flocks, and herds of the farm, until he has learned their mysteries—so far as man may learn them—is all important. In no profession, unless it be that of medicine, are constant observation, quick perception, a cultivated eye, ready resource, more important than in agriculture. The success of its practice depends mainly on an ability to adapt any system of farming to surrounding circumstances, and to decide quickly and readily to what animals and to what cultivation the land is adapted. I will not say, here, for the sake of argument alone, that the good farmer must love his profession; but I will say, that between the good farmer and his land and animals there must be a sort of secret understanding, which can only be secured by the most familiar acquaintance. And with us, the domestic economy of the farm, the farmer's home, his modes of thought, his modes of labor, how he can best live on the land, and be a good husbandman, in-doors and out, and a good citizen, all form an important part of that education which is to elevate and improve our agricultural population. I can hardly express my high estimate of the opportunity for usefulness and distinction which falls to the lot of him who would organize a successful agricultural school, as its president, its guide, its vitalizing force. But next to him in the work stands the man who shall demonstrate to that school the interesting results of an intelligent and scientific appeal to the land, and shall unfold to them the comfort and happiness of a well-organized farmer's home. Much of all this can be encouraged by the Board of Agriculture. From them to the college may be imparted the tone and flavor which appropriately belong to such an institution. Of the practical topics which I have enumerated, they should be the special patrons; upon all the work to which I have alluded they should bestow the benefit of their constant interest and observation. They could not do a better work than to recommend, from year to year, the subjects of a special course of lectures, to be furnished from their own members, as far as possible, and so far as is consistent with the regular course of instruction.

I know and respect, and would carefully recognize the functions of the trustees of the agricultural college, as conferred upon them by the Act of incorporation. But, in order to perfect the institution, I would have the Board of Agriculture stand around it with fostering care, giving it all encouragement, and applying to its development and guidance all those powers which have enabled them, year after year, to present to the community a valuable volume, and have won for them an honorable reputation, as devoted students of the profession which they represent in the Commonwealth. If encouraged, or even if unhindered, they may aid in making the college not only a source of light, but a protector of the farmer against the innumerable temptations which are thrown in his way, to fertilize his lands, and ameliorate his toil; and which too often end in disappointment and loss. Upon them has thus far fallen the labor of discussing the value of fertilizers, the preparation and application of manure, the value of different crops, the merits of the various breeds of domestic animals, the comparative value of various articles of food, the economy of pasture lands, the modes of drainage. Let them bring these questions to the careful investigation of the agricultural college, and the practical utility of both institutions will be recognized, I am sure, even by those who are pleased to think lightly of all efforts in behalf of agricultural education.

I have dwelt long upon the matter before us, longer, perhaps, than is accordant with your patience, but not longer than its importance deserves. I remember with pride the achievements of Massachusetts in literature, science, and the arts, her schools, and all her industries. I remember the oft-repeated efforts of her rich men and her wise men to raise her agriculture up to the standard of all her great enterprise. And it now remains for her to erect an industrial school, in which the maxims of her early patrons of this art shall be renewed, reformed, improved, by the influences which her best science can bring about them,—a school worthy of herself, an agricultural college where thought and labor can meet for mutual benefit and encouragement.

After the lecture the Board took a recess till 2 o'clock, P. M.

AFTERNOON SESSION.

The afternoon session commenced at 2 o'clock, Mr. STOCKBRIDGE occupying the chair.

AGRICULTURAL EDUCATION.

This subject having been assigned for consideration, the Chair called upon Mr. P. STEDMAN, of Chicopee, to open the discussion.

Mr. STEDMAN. *Mr. Chairman*,—I had no thought of entering into the discussion of this subject; for, although I happen to be a member of the board of trustees of the Agricultural College, I am well known to most of you as "an eminently practical man," as our friend Colonel Wilder has expressed it, and practical agriculture is my business rather than the educational part of it. I have my views in regard to the Agricultural College, and they have differed somewhat from those of a majority of the board of trustees; that is, I have been disposed to carry out, in reference to it, the *practical* ideas which Colonel Wilder attributes to me. I think that the practical part of agriculture should be prominent in the teaching there; that while we are not to neglect the scientific branches, but carry them to their highest possible extent; yet, at the same time, one important object should be to teach practical agriculture, and teach it in such a way as will enable an individual to get a living by it; teach our young men how they may support themselves by farming, not how they may expend money in making a fine place, when perhaps many of them have no money to spend, and will not have until they have earned it. It seems to me that we want to give them some such practical education as will enable them to make a livelihood, and at the same time increase the product of our farms, the comforts and mental qualifications of the farmer, and raise the standard of agriculture in every respect.

In the address given this morning, we had indicated some of the means of agricultural education. One, which was not mentioned, but which I think is prominent, and has been the means of accomplishing great good in our Commonwealth, is the formation of agricultural clubs. I think that the discussions which have been carried on in those clubs have been productive of great good to the individuals who have taken part in them, and to the community at large. I am acquainted with several of those clubs whose doings have been extensively reported, and great interest has been created in different localities from their discussions. But that is not all. I am confident that great social benefits have accrued to the individuals connected with them. Our farmers, as a class, have become a more social community, through the influence of these clubs. They have been among the most prominent means which have been employed for promoting the farming interests of this Commonwealth. We, of course, look for great good from the pursuit of agriculture in a college, and I trust when the Agricultural College goes into operation, we shall have connected with it, yearly at least, a series of meetings, corresponding to the one we are now holding, or corresponding, perhaps, more nearly to the one which was holden in New Haven, in connection with Yale College, some four or five years since, which many of us recollect, and which, if I mistake not, was continued two weeks. There was a tuition fee, and I know some young farmers who went from Massachusetts, and made it their business to attend those meetings. I think the tuition was twenty dollars. They paid that, and hired their board in New Haven, and spent two weeks there ; and, so far as I know, they were abundantly satisfied with the way in which they had spent their time and money. I know some of us who were older who spent our time there, were very much pleased with the instruction which we received, and with the interest which was created ; and I hope that twelve months from this time we shall be able to have a meeting at Amherst something like that at New Haven.

As I said at the outset, this is a subject on which I did not think of saying one word, and I hope some other gentleman will occupy the time.

Prof. P. A. CHADBOURNE, of Williamstown. I have been requested to make some remarks at an early period of this discussion, and I do so with the understanding that I shall be very likely to make more before the discussion closes.

I need not say to you that I was very much interested in the address which we had this morning. I think it contained very many things of great importance to us as a Board, having a bearing upon agricultural education. I was glad to hear the lecturer say that agricultural education is in its infancy. If that is so, some mistakes can be pardoned. Everybody who brings up children knows that he has to pardon something to young children; they will make mistakes; and we must expect to make some mistakes in agriculture, if it is in its infancy, and I believe it is.

The first point which I wish to make here to-day is one that perhaps will not meet with the assent of all present; and that is, that America is the most difficult place in the world, at the present time, to bring agricultural education to a high point. I know the arguments that will be urged against this. It will be said that the general intelligence of the people makes it possible to bring agricultural education here to the highest point. Now, I shall bring forward some arguments on the opposite side. I am speaking of *America*, mind you, not Massachusetts. By-and-by I shall make an exception in favor of Massachusetts, and perhaps of New England. I say that America is the most difficult place in the world to raise agricultural education to a high point, for the reason that every man can obtain just as much land as he wishes to cultivate, and just as much of the very best land in the world as he wishes to cultivate. And so it has come to pass, that, taking our country as a whole, what people have done is to take out of the soil, in successive years, all they could get, and then move to another place, and take up new and virgin soil. Every one who has travelled through the South and seen the cotton and tobacco lands, knows that this is true in regard to that section of the country. They have taken up one plantation and exhausted it, and then removed to another. And what are our Western people doing? They are taking crop after crop from the land and sending it away; and every crop they send away takes so much from the richness of the soil. The soil is very rich, and it will take a great many years to exhaust it; but the process is going on. All that the people have hitherto been called upon to do has been to invent means to put in the seed and take off the crops. Invent the best means possible for robbing the soil, and you were supposed to have done the best thing you could for America. That is the truth of this matter. I had an offer this fall to take the presidency of a Wisconsin college. It had an agricultural department, and I said, "The most difficult department you have got is the agricultural department." They said, "This is an agricultural community; it is the great interest of the State." "But," I answered, "you have so much land, and the land is so productive, that you cannot make it worth while for the people to spend their time in studying how they can make it more productive. You cannot bring agricultural education up to the highest point here." When we come to Massachusetts, we find a different state of things. We cannot go on robbing our soil year after year. If we make our draft upon the soil without making any deposits, they will be protested; and hence we are called upon to keep our bank account all right. Now, if there is any place in America where agricultural education can be brought to the highest point, it is in Massachusetts, for three reasons. In the first place, its soil is limited; in the second place, it is of such a nature that it is impossible to take off crop after crop without restoring its fertility; and, thirdly, the people are generally intelligent. You have here the three elements which in Massachusetts will tend to bring agricultural education to a higher point than it would be possible to carry it further west or south, where the land is so unlimited, and where they can take crop after crop from it year after year. This I consider the hopeful feature in regard to agricultural education in Massachusetts; that we are, from the very nature of the case, compelled to give it that thought and that study and that practical turn which are not called for at the West nor at the South.

Another thing I want to call your attention to, and that is, a comparison of our agricultural institutions with those of Europe. The two classes that attend those schools in Europe are entirely different from the class that will attend the Agricultural College of Massachusetts. And what are they? The first class—the highest class, as I understand it—is composed of those who are being trained there to become stewards of great estates. There are many great estates in Europe, and the owners must have men to take charge of them. These men must be trained, and an Agricultural College is the place to train them. Then there is another class, who understand that their business is to dig and delve, and they have a place assigned them in those institutions; but their place is a lower one. We have neither of these classes here. We have no such great estates, requiring stewards to manage them, and we have no set of men who understand that their place is to dig and delve, while somebody else owns the soil; but every man is, or expects to become, an owner of the soil, and carry on his farm for himself. Now, any one can see that we have an entirely different thing to do. We are to educate men who are the owners of the soil, not men who carry on estates as stewards; and therefore the success or failure of those schools cannot be taken as a standard for us.

A few more words in regard to the position of Massachusetts. All other New England States, excepting Maine, have given their agricultural money to colleges. Vermont, Rhode Island, Connecticut and New Hampshire have all given their agricultural money to institutions already established, and they are to have a sort of agricultural department; that is, they will have some lectures on agriculture. Massachusetts has said that shall not be done in this State. She proposes to start an Agricultural College; and when you consider the position of Massachusetts, and her wealth, and the means she has of building up a college, it will undoubtedly be an Agricultural College worthy of New England.

It is most difficult to decide what is to be done in this college. However, the ground has been mapped out, and has been mapped out in such a way that I myself feel satisfied with it; and I accepted the presidency of this institution, believing that the ground had been well mapped out, and hoping that no essential change would be made until the experiment should be fairly tried to see if it is to be a success or not. And since I am a member of the Board, and we are discussing the relation of the Board to the college, I have to say, if I am not interfered with, and if the character of the college is not changed, (and if it is I shall feel my relation entirely different from what I now do,) I shall feel it my duty to see the experiment fairly tried, if I never receive a cent for my services—if I have to go abroad and lecture, as many of our teachers do, in order to make a living while I am teaching. For the first class that comes in I expect to do a great deal of the teaching myself; and, if necessary, and I cannot get any one else to help me, I will do it all, (applause;) and if the State cannot pay me for it, I can live without it.

Now what do we propose to do there? In the first place, gentlemen, I hold that it is impossible for us to fix upon a low standard of education in that institution. In some of our institutions, I am sorry to say, they are so anxious to gain students that they go on lowering the standard, dipping deeper and deeper, taking a net with finer and finer meshes, and finally they get nothing but minnows, and very few of them; while those colleges that insist upon a high standard of education go on increasing, in spite of all adverse circumstances. I said to the trustees of that Western institution, when they called upon me for my plan of education: "Just look at the institutions of our land. During the last five years, while war has been raging, many of our small institutions, with low requirements, have been almost blotted out; but Harvard and Yale, where they have a high standard and work up to it, have not grown smaller but larger all the time; and this shows that the way to meet the requirements of the common people is to have a high standard and live up to it." If you want an illustration of this, I will refer to the case of Brown University; and I feel justified in doing so because I have had, from its president and professors, within three months, some account of it. You know that some few years ago they undertook to change their standard; it was called "the short road, via Providence, to a college education." And what was the result? It was thought that, under the lead of that eminent man, Dr. Wayland, they would have so many students that all other colleges would be swept away—annihilated. The result was, that the people emphatically repudiated the whole thing, and they have had to give it up. I want to make this emphatic. I want it understood that there is nothing but the highest standard of education that will ever draw together the sons of farmers. If you do not have that high standard, they will send them to other colleges to give them their education, and then let them get their agricultural education the best way they can. I am sure of that. This has been the uniform result—that just as institutions have lowered the standard of education, they have lost prestige and failed of their object.

As the lecturer said this morning, agricultural education is in its infancy. It is said that there are not professors enough in the United States to carry on an Agricultural College as it ought to be. I believe that fully; but is that any reason why we should not get together all we can, and have young men and old men preparing themselves, and doing all they can to build up men who shall be fit to carry on an Agricultural College? We must bring the brands together to kindle a fire. If we have not the means to get the best men for a whole year, let them come for a month, a week, or even for a single day. I would give more for a whole man to stand up and lecture to one of my classes for a single hour than for some other teachers for a whole term. He will give the students more power, more insight into the methods of study, and what men can and ought to do, than the man who will plod on the whole year without any life-power, any perception of the human mind, any perception of this world, and any perception of the relation of one to the other. If I am indebted to any man to-day for any mental power, it is to some men who, in a single lecture or in a few minutes' talk, have given me a new insight, and left me to work my own way out. We need and must have those men; if not for a year, then for a day or an hour. Let the young men see them and hear them talk; let them take their measure and have them for a standard.

There are three things which we propose to have, as I understand, at the Agricultural College. The first is an educational course. They have made a four years' course of it. It is not proposed that young men shall go to another institution for their education, and then come there and spend a few months to get a knowledge of agriculture. A man may do it; but the idea is to establish an educational system, and one that shall have special reference to agriculture—the whole thing. Well, gentlemen, what is agriculture? As I understand agriculture, it is simply the practical application of chemistry and botany and zoölogy. It is natural history and chemistry applied; and the deeper you can put a man into these things, and the broader principles you can lay down in reference to them, the better agriculturist you will make. But then every teacher has thrown away a great deal of time in trying to get general principles into the minds of men that have not the first rudiments of education. I am glad to see Professor Agassiz before me, for I know he will bear me out in this statement. You can make artisans of them; you can get them so that they will observe the scales of a fish; but then they run off into some absurdity or Darwinism, and there is no way of getting them back; you cannot hold them and you cannot benefit them. You want to educate them so that they will know what you are talking about. How often you talk to men who cannot understand you because they have not the slightest conception of the principles underlying what you say. The first thing you want to do is to secure this education.

The second thing, I understand, is this. Certain men get their education in other places, but they want to give a certain amount of time to agriculture. I would have the course so arranged that any man can come and enter that college for one month, three months, six months, or a year, and select any studies for the time-being that he is fitted to pursue, and attend any lectures of the course, so that no man, simply because he is not fitted to enter college, shall be debarred from the advantages of the institution. That has nothing to do with the regular college course; that must be carried along as the basis, the substratum, which shall give dignity and permanency to the institution.

Another point is just the thing to which Mr. Stedman has referred: that every year there shall be delivered in that college a certain number of lectures on agricultural topics; and I trust that the subjects to be discussed will be suggested by this Board, in its organized capacity, and the lecturers designated,—four from one man, eight from another, and ten from another. Some of the most prominent agriculturists of the State have promised me that they will come and deliver these lectures; or, if they cannot come themselves, they will hire men to take their places. I propose a six weeks' course of not less than three lectures every day, on such subjects as physical geography, agricultural chemistry, zoölogy, botany, structural anatomy, reproduction, rural architecture, and so on; making a full, complete course, and one that I should be glad to hear, myself, repeated year after year. And that course of lectures, gentlemen of the Board of Agriculture, if I remain connected with the institution, I wish you to take under your patronage, and suggest from year to year the lectures that shall be delivered ; and if you can select from your own Board members who can deliver a large portion of these lectures, I shall be very glad of it. We shall thus bring every year before the young men of that college the very best scientific talent we can possibly find, and the very best practical agriculturists that can be found in Massachusetts ; and the oftener they come, the more they lecture, the better I shall like it.

Professor AGASSIZ. I should be glad to make a few remarks upon this subject. Professor Chadbourne has touched upon some of the most vital points in connection with the establishment of the Agricultural College which can be brought to your notice. He has touched upon the condition of our schools generally, and upon the condition of our colleges ; and you cannot make an Agricultural College prosperous,—and in Massachusetts no more than elsewhere,—without taking into consideration, in connection with it, the condition of other schools. I was delighted to hear from the president of that institution those liberal and far-sighted views which, under his guidance, will become the life of the institution ; but however well-devised the plan of instruction may be, however comprehensive you may make such an institution, you cannot begin with the a, b, c. The pupils must come with some preparation. Therefore, you have to found on your common schools to start with ; and then you will carry on your education so complete and so perfect and so advanced in the application of science, that the best scholars of the University, after they have completed their collegiate course, will want to go to that college, too. So you cannot organize your Agricultural College, without taking into consideration, not only the elementary schools, not only the high schools, but the colleges, also. An Agricultural College, in its perfect organization, must occupy a place, a sound, healthy and active place, in the general system of education in Massachusetts, which shall cover all that Massachusetts men want ; and therefore, upon that connection, I should like to say a few words.

We at Cambridge, in our college, are as perplexed to reorganize the University as you are to organize an Agricultural College that shall meet the wants of the time. Our college has done its work nobly; it has stood at the head of education in the United States. From it have gone some of the most learned men, some of the most prominent men in public life; and yet I say that that institution, with all its wide scheme of instruction, has done its work, and must be reorganized in order that it may be up to the requirements of the time; and we feel this so strongly, that at this moment there is a committee of the professors who, in connection with the president of Harvard, are considering in daily meetings,—not in weekly or monthly, but in *daily* meetings,—what shall be done to prevent Harvard from falling behind. And, gentlemen, let me say to you, that the pride of America,—our public schools,—needs the same overhauling. They require a new nursing. They were framed after a vast deal of preparation had been given to their details, and after reports by Horace Mann, who had studied the best schools and the best system of teaching in Europe. His information was adapted to the wants of the community at that time, and out of that, and what we had already gained, and what was already in practical execution, has grown that admirable system of popular instruction, which has given America that general education which every man enjoys. But I say that that system needs nursing again, and must be overhauled anew. For what reason? Because the public schools must send pupils to the Agricultural College that shall be fitted to take hold where that college begins—for beginning it must have. It cannot begin with the a, b, c; or, if it does begin with the a, b, c, in botany, in zoölogy, in mineralogy, in geology, in physical geography, it cannot go so high as to meet the enlightened views of its president. If it is expected to grow, the common schools must send there scholars who have already the a, b, c, of what shall be taught there; otherwise, the college will sink to that low position so well described by Professor Chadbourne, to which some colleges have allowed themselves to fall, merely for the sake of gaining a temporary popularity. We do not want any of that sort of humbug. We want something substantial; and that substantial thing which we want is education, as general as before, as liberal as before, but a little better adapted to the wants of the age than it is now; as well adapted to the wants of the age as it was in the beginning, but a little better adapted than it is at this moment, because, at this moment, everybody who goes to housekeeping must know something of chemistry, something of physics, something of mechanics, because we have, in the means of carrying on the every-day business of life, nay, we have in the kitchen ranges, the heating apparatus and the cooking apparatus, that which requires that everybody should understand some of the principles of chemistry and physics. For that the school should provide; but for that the school does not provide, and the instruction necessary for these things is not to be had in our colleges. We have, in one word, too much book learning, and too little teaching of things. (Applause.) Let me not be misunderstood. I am a book man, and I am not going to slander books; but I desire that books should be reduced to their proper sphere; that we should have so much of books as is necessary to help the memory and carry on the general system of education, but that the whole shall not be books; that our children shall not be merely machines to commit books to memory, and then not know how to use what they have committed. In order to do that, gentlemen, there is a radical change necessary, and one which I see hardly any prospect of introducing. You must select from the whole community the best and most intellectual men—the men most capable of comprehending things in their general relations,—and intrust to them the elementary schools. Until the man who receives the highest salary in any place is the school-teacher, you will not have brought things to the right position. There are thousands of ways in which men in other positions can help themselves. The man who is in office, or the man who has a liberal profession, can help himself; but the teacher, if he will be true to his duty, cannot help himself beyond receiving his quarter's salary, and living upon that, because his duties are enough to absorb all his energies; and still you can pay more to the clerk who takes care of your property than to the man who takes care of the soul of your child. Is that the proper thing in a Christian community, in our days?—that the cashiers of banks, that the keepers of books in counting-houses, shall receive higher salaries, and, be estimated as more valuable men, than those who educate the community, and those who make souls worthy to be the souls of freemen? It will not be so, I hope, in the future. I trust that the foundation of the Agricultural College will be connected with, and work in behalf of, an improved condition of the teachers of the elementary schools, and of the teachers of our colleges and higher institutions of learning. Of this you may well be satisfied, that you cannot have an agricultural institution well organized without securing from the public schools the pupils that will profit by it. Do that, and all will be well.

LEANDER WETHERELL, of Boston. I have been very much interested in the remarks of the last speaker with regard to our public schools. A gentleman inquired of me the other day, in regard to these schools: "What is their greatest defect, in your judgment?" My reply was: "Too much book, and too little things." I was very much pleased when Professor Agassiz made that statement, because it so fully concurred with my own convictions; and I as fully concurred in what he said afterwards; not that I have any objection to books, for I am too fond a lover of books to cast any slander upon them; they are our aids in every way. But there is such a thing in our public schools as making the children memorize books until they become mere machines, to bear about in their memory what other men have thought and written down, without seeing the relation or connection between those books and the things which have given the authors the elements out of which to make those books. I trust, therefore, as the professor says, that we shall see this reform, which he says is so much needed in our public schools, inaugurated. They need improvement, in every sense of the word, in the line which the professor has indicated; and therefore, Mr. Chairman, I trust that the work will begin, as the professor has well said, at the elementary institution of our educational system, for that is the right place.

I was glad, also, to hear the remarks made here by those officially connected with this college, that opportunities are to be given to young men, and older men, if they desire, to attend the lectures at the institution, without going through a fixed course, as in the case in most of our colleges. I believe there are institutions already in operation that are as good as we can make, as good as we can desire, for educating the mind. For instance, in the department of mathematics, how could you do better than to go to Cambridge? And so I might go on and speak of other departments. In that view, I was glad to hear the president say what he did, to wit: that you may go to the

Agricultural College and learn what you desire to learn. If professors are not to be found, it is time we had them; and if we do not begin we never shall have them. But create the demand for such professors, and as soon as the demand is made the supply will be forthcoming. And therefore I do not believe, as has been intimated, that we cannot carry on the college because there is nobody adapted to it. This would be an argument against all progress and improvement in anything. Just demand of the people what you want, and they are ready and able to furnish what you desire. I think this will be done with regard to teachers and lecturers, in what relates to agriculture, as it has been done in other things; and therefore, Mr. Chairman, I hope the work will be begun where it has been said to-day it ought to begin; and then let it go forward under the guidance of the best minds of our Commonwealth, who are always willing and ready to aid in carrying forward such a work.

I think the allusion made to Mr. Mann was well-timed. He awakened among the educators of this State a spirit that has done much for our schools; but since Mr. Mann passed away, those who have followed him in the care of the schools seem to be resting, as it were, on what he inaugurated. We need at this day another Horace Mann to go into the field and inaugurate a system of improvement in our schools, to suit them as well to the present wants and demands of the people, as they were originally suited to the wants and demands of the people at that time. I trust that this point will be urged.

Further, Mr. Chairman, with reference to the difficulty of getting young men to engage in agriculture, which was touched upon by the president. He stated part of the difficulty, but I do not think it was all. He says our young men have rich lands open to them at the West, and they go forward and occupy them as soon as they have exhausted the land here. That is too much the case; but, Mr. Chairman, there is still another difficulty, which was touched upon by the last speaker. He said that men are better paid in our banks and in our offices of all kinds than they are in the work of teaching, or would be in the work of agriculture; therefore the young men leave the farm because the talents, capacity and culture that they get will be better paid in these other avocations. The question has often been put: "Why do our young men leave the farm?" I answer, "Simply because other avocations pay them better than they can be paid on the farm;" and so long as that is the case, and men desire to use whatever capacity they have to the very best advantage, you will find this will be true. I think the difficulty, after all, is in this direction. You may educate the best young men of this Commonwealth in the best possible manner for the farm; but when you have effected this, their talents will command a higher price in other pursuits than they will on the farms of Massachusetts and elsewhere; and that being the case, the tendancy with them will be to leave the farm when they leave the college. I would like, therefore, to have that point of the question discussed—how we are to tempt the young men who are training themselves in the college to remain on the farm? They quit the farm, we know. The last place where an educated man will work with his own hands is on a farm; or, if the doctor tells him, "You will certainly die unless you go to work in the soil," he will leave his office or profession as the last resort, not because he desires to do so, but because he must. We all go, say what we will against it, for what pays the best. I find no fault with that; it is a principle we should all be very much actuated by, whatever profession or business we were engaged in. Therefore I hope something will be said with reference to this problem: how to retain these young men that you educate on our farms. There is a desire thus to elevate the agricultural community. I hope it will be done; and I hope this college will be one of the instrumentalities whereby we shall do much towards elevating the taste and increasing the desire for rural pursuits. It is true, say what we will, that there is a desire in almost every man to live on the soil. It is the most natural way for a man to live. There is too much desire among our people, at present, for money. There is too much running after the "almighty dollar," no matter what it costs, and too little thought of those comforts which come from a good rural homestead, such as our New England furnishes, with all the social advantages surrounding it. I therefore trust, that in discussing this important question—one in which we are deeply interested, and in regard to which we all have our hopes and our fears—no word will be said to dishearten, discourage or turn aside the public spirit that would inaugurate an institution of this kind for this Commonwealth and all New England, and therefore for the good of our whole country. Let us take hold of it as men, and do what we can in our way for the promotion of this noble enterprise, for it is one of the grandest the Commonwealth has ever inaugurated. Let us see that it is so conducted as to secure to our posterity that good which we here to-day hope they may enjoy.

ALLEN W. DODGE, of Hamilton. The question which has been put by the last speaker is one that has been put to me time and time again by intelligent farmers; "After you have given our young men this superior education at the college, how are you going to prevent them from quitting the farm?" I heard a man put it in this way the other day: "The moment you educate a man, that moment he quits the farm; and if you want to keep the farmer at home, keep him in ignorance." I have had that question put, as I say, again and again. It is a very difficult question to answer. So long as other business pays better, and farming is more profitable at the West than here, we cannot expect, by the mere profits of farming, to keep our young men on the farm. But there are other motives that come into play. How do you get men to preach the gospel? Every year there are a large number of young men turned out from the theological institutions of the country who enter that sacred profession, and devote their lives, on very small salaries, to the accomplishment of a good work. Why is it? It is because they have a certain amount of enthusiasm and love for the work; they go into it from a conviction of duty; and that enthusiasm leads them to surmount all difficulties; and money, from their standpoint, looks like a very inferior object. So it is to a certain extent in some other professions—in that of teaching, for example. How many men labor as teachers through their lives, who, if they went into counting-rooms or banks, could make double the income they do from their profession as teachers. I think the great requisite in a college of this kind, in order to lead young men, after they have graduated, to go into farming, is to inspire enthusiasm; and from what I have seen to-day of the gentleman who has recently been elected to preside over the institution which is now in an embryo condition, but which I trust will one day be born to be a living child, I think he is the very man to inspire that enthusiasm. I know a little of farming. I went on a farm from a profession, and it was a new world to me, even to the feeding of swine. I could take an enthusiastic interest in that—to see how I could do it in the best way. If you can only succeed in inspiring the farmer with an enthusiastic devotion to his profession, depend upon it he will never give it up. That is what we want, and not the dry details—not the mere drudgery—showing a man the dark side of everything, and not permitting him to see the glorious light that shines upon his profession. A man said to me the other day: "What is there to attract a man to farming—what literature? I never read a book on agriculture." "It only shows your ignorance," said I. "There have been more books written on the subject of agriculture than any other, probably, except theology, that you can name." Let a man get interested in the study of some specific subject, and follow it up, and see what different authors have said upon it, and he gets inspired with enthusiasm; and the moment he gets enthusiastic in his work he will go to books and to intelligent men to find out all that can be learned about it. This is the great thing. A man wants to be filled with enthusiasm; and I will say to all interested, that this will carry a man to the farm if anything will. I believe that if the college goes on—and we trust it will—if the first class graduates twenty men, nine-tenths of them will go on to farms, and at once their services will be sought for and valued. Let a man go on to a a farm and be thus enthusiastic, and what does he do? Why, his enthusiasm is capable of inspiring all about him with enthusiasm; and where men work with a will, how different it is from where they work under compulsion. It is all the difference between a freeman and a slave. The man thus educated will command his price, and then the money motive comes in.

On this whole matter of agricultural education, it seems to me that the more I look at it the less I know, and the more I am convinced of the difficulties of the subject; and for this reason—the whole thing is in an unformed state. The first great difficulty that Massachusetts has in establishing such a college is the work of organization. There are few or no precedents. The only successful precedent, so far as I know, in this country, is the college of Michigan, and that has had a good many pullbacks and difficulties. I don't know but that is the most successful institution we have. The one in Pennsylvania which Professor Pugh carried on for a few years, is now being changed into a different college. It is a failure from all I can learn of it. We have got to start an institution on an entirely new track, and make our pathway as we go along. How shall we make it? I do not believe that a Board constituted as the Board of Trustees of the Agricultural College is—twenty men—can do it. Twenty men would be very likely to have twenty minds. My idea is, select the very best man you can for president, and then give him a wide margin. Let him go on and stamp it with his individuality; let him mark out the course, and do not interfere with him unless you are satisfied he is going entirely wrong; because it must be an experimental matter for a time, no matter who beats the path; for your road is all a *terra incognita* to you, and if there are twenty men, somebody must go ahead and hold up the light for others to follow and beat his track. Now, if you elect a man who has education, who has a comprehensive knowledge of the wants of the time, who has himself been already a teacher, and who is chosen with especial reference to this thing, it appears to me it is a part of his duty to go ahead, and that the trustees should interfere with him as little as possible. I think that one of the most instructive lessons in regard to starting an institution like this, is to be derived from the history of Girard College. Mr. Girard left a large fortune, you know, to found an orphan college in Philadelphia. He designated, as the board to oversee it, the city government for the time being—a very large body, chosen without any reference whatever to this college—and other bodies, I think; but at any rate a very large number of men; and for some thirteen years this college was floundering about, beating its pathway, but going round in a circle, and doing nothing at all. In a review of the history of that college, published about two years ago in the "North American," written by some one who is evidently very well acquainted with the subject, the writer says that if three men or one man had had the starting of that college, and impressed upon it their or his individuality, the college would have been a success long ago, without all this loss of time and money, and that the great mistake was in burdening it with too many overseers.

Now, with regard to the connection of the State Board of Agriculture with the Agricultural College. That is already an established fact; our legislature have passed a law to that effect; therefore it does not seem to me that the expediency or inexpediency of that is a matter to be discussed. We have got to wait and see what will be the result of that experiment or that law. I have not a word to say about it. I have listened with great interest to the gentlemen who have spoken on this subject; but it will not do for us to flatter ourselves in regard to what we are going to do with the boy until the child is born. The child is not in being yet. I want to see the child born. I want to see the Commonwealth safely delivered of this child, that we have been hoping would come into being. I will bow down and worship him when he comes, and my only hope is, that Professor Chadbourne will usher him in.

Mr. STEDMAN. I cannot agree that the present number of the Board of Trustees is so large as to impede the progress of the college and make it unsuccessful. How has it been with the Board of Agriculture? Have you ever heard of any quarrel among its members, or has it gained ground during these years of its existence? And yet it is composed of twice as many persons as the Board of Trustees of the college. The Board of Agriculture is composed of one member from each society. I have full confidence, Mr. President, that the Agricultural College has now been placed in such a situation that it will go into successful operation. It is true that I have been in a minority. I was opposed to its location at Amherst, but I have never desired to impede its progress; and however much my faith may have wavered at times with regard to its ultimate success, I am fully confident that it will now go into speedy and prosperous operation.

With regard to the other question, how we are to keep young men upon the farm after we have educated them, I do not believe that it is important for us to discuss it. Enthusiasm will do a good deal, undoubtedly; but suppose they do not remain upon the farm, the education has not hurt them. But, as has been intimated, and as we all know to be true, every man in professional life has a desire at some time to settle upon a farm; and a great many, after having accumulated a competency in other pursuits, have bought farms, on which they have expended a great deal of money. And what has become of them? In many cases the farm becomes a source of discomfort, anxiety and perplexity, and they find themselves in a worse tangle than in their ordinary business, and sell out and abandon the whole thing. Not long since, a gentleman who had purchased a piece of land near me made some inquiries of me. He said he had purchased this land, but didn't know how he should make out with it, and asked me some questions. I told him if I had it I could make money out of it, but I didn't think he could. I think it will be a source of great discomfort to him, and after struggling along a good many years he will sell out and determine to live without that perplexity; whereas, if he had had a practical education, I have no doubt it would have been a source of great comfort and pleasure to him. And now I say, if nine-tenths of those young men go into other business, the education is not lost. A large proportion will eventually return to the occupations of the farm, enjoy its comforts and blessings, and enjoy the benefits of the education which they have thus received, and which appears, perhaps, for a time, to have been thrown away.

Professor CHADBOURNE. There is one single point in regard to which I think there is great misapprehension in the minds of the community in connection with the Agricultural College. I judge so from letters that I receive and intimations that are dropped from time to time. There has been some controversy with regard to the location of the college. I am glad I know very little about it, and I never intend to read up on it. "Let the dead past bury its dead;" we have enough to do with what is alive. But what I want to say is, that I hope the impression will not go abroad that the Agricultural College depends upon this location or that location, this kind of buildings or that kind of buildings. An institution is made up of its president and faculty—the *personnel* of the institution. Give us that, and give us a barn to work in, if you please.

C. O. PERKINS, of Becket. Some points have come up here, and some questions have been asked, which I have thought upon. The question is asked, "How shall we retain these young men upon the farm?" Is the only question for the farmers of Massachusetts how to create farmers—how to increase agricultural knowledge—or is the question how shall they best make men of their boys? If we want to make farmers of our boys, my observation is this—that we must keep and continue those boys on the farm. We may take our boys off the farm in the winter for three months and send them to the school or academy—that is, as long as they will bear to be taken from the farm and go back and be satisfied with it. We are satisfied with the employment we are in until we learn that there are others which are better; and when we do we are dissatisfied, uneasy. And when a boy goes to school and learns philosophy and chemistry, and various other branches, and sees that those who are better educated in these things than he is, are more respected, he becomes dissatisfied and is unwilling to return to the farm. I have in my mind some smart young men who will make capable farmers—are so now, indeed. They have been kept constantly at home, under their father's eye, and schooled in winter. They do not know how to do any other work, and as long as that is the only work they know how to do, they are satisfied with it. We all like to do that which we know how to do; we are none of us inclined to take up a new work.

But another question comes into my mind: where are we going to get these boys? The population of Massachusetts is becoming a foreign population. Statistics show that between 1850 and 1860 more Americans died in this State than were born; and during the same time our population increased 27 to the square mile. Now, is it advisable to keep our boys on the farm? I say, educate them as far as possible, and let them make their own selection. I have a boy just coming of age. I told my boy, two years ago, I didn't wish to make a farmer of him; I wanted him to go to school until he knew more than any Perkins he ever heard of. I regret that I have never had those advantages of education which would enable me to give others the benefit of my knowledge; now it can only benefit me. One gentleman says he believes that nine-tenths of the young men graduating at the college will take to farming if it is made interesting—if enthusiasm is displayed in the management of the institution. I admire enthusiasm. It is necessary, not only to our neighbors but to ourselves, to make our own blood circulate freely. We have an enthusiastic man as president of that Agricultural College, and he will do all he can; but he cannot do everything, and enthusiasm will not do everything. Enthusiasm will not send nine-tenths of those young men back to the farm. I will tell you where they will go; Professor Agassiz will tell you where they will go. He has got hundreds of thousands of specimens which he is unable to set up, because he cannot find those capable of doing the work. The moment he gets them properly educated for that labor they are taken away as professors in other institutions—even before he is willing to admit that they are qualified to fill those places. He is borne down with cares, and may go to the grave leaving these specimens unarranged. No one man can do all that work. When these young men are educated I hope they will not go back to their farms; I hope they will go and help him. Vermont is raising sheep and selling them to the West for $6,000 apiece. The Vermont farmer says if the West will pay us that we can afford to raise them; and if the West will take our young men we do not want them to go back to the farm. But when a man begins to bend towards the earth the mind also turns to the soil, and then the knowledge he has obtained in youth will be of service to him. He knows how to work; he knows all the details of the farm. I would never send my boy to an Agricultural College to learn the details of farming. The more labor you put into a college, the less brains you put in there. You cannot make brains and hands work with the same body, successfully, continually. You do sometimes find men who can do an immense amount of hard work and an immense amount of thinking; but they are "like angels' visits, few and far between." A great many of these hard-working and hard-thinking men, when they get to be fifty or sixty years old, and have accumulated a small competence, have one ache in the shoulder, and another in the back, and go prematurely to the grave from overwork. Our substantial farmers work too hard, and our boys do not work enough; but if we want to keep them on the farm we must keep them ignorant of all other branches of knowledge.

I had written out some ideas in regard to the Agricultural College, but I think I will not read them. It is said, "'Let the dead bury their dead;' we have an Agricultural College located at Amherst, and it is bound to be established there." Well, I do not know what to say. If I should say I am satisfied it will be a failure—that it can never be a success there—then it would be said that certain individuals were doing all they could to break down that college. I do not believe the college can be a success there. I do not believe that all the enthusiasm which

Professor Chadbourne has,—and I will accord to him that he can do all that any live man can do,—I do not believe it is possible even for him to make the Agricultural College there a success. I will tell you some of the reasons. In the first place, we have not the means to do it. When Congress made that grant of land to us, it restrained us. That is, it said: "No State shall locate this scrip outside its own limits,"—that is, in another State,—" but the State's assigns may locate it." We had no land in this State, but our legislature chose a commissioner to go and locate that scrip. When they found they had made that error they allowed the commissioner to sell the scrip. That land was subject to entry at a valuation of $1.25 per acre, and has been sold at about 80 cents an acre; so that the difference between $1.25 and 80 cents we have lost. Now, how is it in other States? The State of Connecticut sent a man to locate these lands and assigned the scrip to Yale College. In that way the college gets the benefit of the prospective rise of the land, and eventually this land will be worth $5 an acre. In the State of New York, Ezra Cornell came forward and offered $500,000 for the scrip if they would take the Agricultural College of the State of New York, which had been a failure, and locate it at Ithaca. He has located the scrip and is selling the land at about $5 an acre. Now, we have two-thirds of 360,000 acres of land as a fund to start an Agricultural College, and Judge French says that, at five per cent., it will amount to about $8,600 a year; and even at six per cent. it will only amount to about $10,000. We have got 400 acres of land that we want to make blossom as the Garden of Eden. We ought to expend $10,000 every year for a long series of years in order to bring that land into good shape. The whole $10,000 will be consumed in the salary of the president or one first-class professor, and in what should be done to carry on that farm successfully. It may be said that the State of Massachusetts is coming forward to furnish all the money needed. Professor Agassiz has said that that college cannot be run for $20,000 a year. The State of Massachusetts may come forward to assist the college; but when all the branches that are to be pursued there, except practical agriculture, (which means manual labor,) are taught successfully within a mile and a half in another college, why do we need to put the State to the expense of getting a new lot of professors and new buildings and start the whole thing anew there? When we have got the whole thing in progress—when we have got laboratories, and a geological cabinet, and lecture-rooms, and a library, and all these things are in successful running order—I should say by all means send these young men down to that institution to have them schooled in all that is necessary to make them educated men; and then have that farm as an agricultural department, and let it be carried on with all the nicety and taste that can possibly be brought to bear, and with all the enthusiasm, too, and let the boys there see how these things are done.

But then, some one says, the legislature have provided that the boys shall dig with their own hands. The legislature, when they said that, made as much of a blunder as they did when they said that the commissioner should go and locate those lands. No Agricultural College in the world has been successful where manual labor on the part of the students was compulsory. I would have the most skilled hired laborers, and let them carry on all the manipulations of the farm, and let the boys look on and become interested, and, if they choose to take hold, let them do so.

Mr. STEDMAN. I think the gentleman is mistaken if he supposes manual labor is to be compulsory.

Mr. PERKINS. It reads as though it was expected. This is the language of the Act: "They shall make such provisions for the manual labor of the students as they may deem just and reasonable." My preference in regard to that institution would have been to have connected it with Harvard University, and built up the greatest institution in the world, so that our people need not go to France or Germany or anywhere else to finish their education; and let there be a department of agriculture connected with it. Harvard College has been in existence two hundred and thirty years, and spends $160,000 annually for its running expenses. How can we build up an institution that will be an improvement on that, further than by attaching an agricultural department to it? There would have been some propriety in establishing an Agricultural College where there was no other college. There the local community would have helped sustain the college. But the local community of Amherst does not require two colleges there.

Again, you cannot get teachers. If you had $150,000 to-day to spend in the employment of the best teachers, you could not find teachers in this country that would fill that school. Our ablest men are located and fixed for life, and we have men that nature does not duplicate oftener than once in a generation. If we can establish something that will duplicate them oftener, let us do so; but the only way we can do it, in my judgment, is by bringing up our institutions that have been in operation for two centuries and more, and that have the largest endowments, and are still adding to them. Our learned men like to find their equals or superiors if they are to be found. They do not care to go to Amherst; they come to the "hub of the universe" if they want to get the most knowledge. I would like to create an institution that should not only be an honor to Massachusetts, but eclipse all other institutions in the world.

E. W. Bull, of Concord. I did not intend to say anything on this subject; but I cannot help thinking that our friend Perkins has lost his faith, somewhat to my surprise, I must say. Notwithstanding that what he says would lead us to believe that farming lets down the intellect; that the cultivated man cannot be kept on a farm; that the moment you send a man to college to improve him he ceases to be a farmer; I want to ask him, are they less intelligent in Berkshire than they used to be? Are they poorer farmers? Are they not better? Have they not advanced as far as the rest of the people of the State upon the path of civilization on which we have all been rising? I think they have. I should be slow to doubt it. I believe it is because of education that all this has happened. You cannot keep the young men of Berkshire and the western part of the State at home when they have so much better opportunities at the West. But those who remain are better; certainly their farms are better. Farming goes on, cattle husbandry and sheep husbandry and all other things go on better than in former years. You have educated a surplus to go out and quicken all the land; and it is because of this education—this constant intellectual activity in New England, which improves our men so much—make them better farmers, better artisans, better teachers, better merchants; it is because of all this that the great West is what it is to-day, and is not like the South. If it is an individual loss to the parent—if it is a loss to the neighborhood—it is a gain to the whole.

Now I believe, with our friend Dodge, that there is in every living man a love of nature, if you can only waken it. I believe if you open to him the path of success, and wealth, and honor, and he achieves them all, he longs for the earth again, he longs for the homestead ; and like your Pickering, your Lowell and your Buell, he returns to that first love, and by example and teaching influences the race. We owe to those men how much more than to a world of practice, however good it might be, of which you would see and hear very little, and which could not quicken the multitude like the record of that practice, intelligently presented to the minds of the people. I believe in agriculture ; I believe that Massachusetts has it a part of her mission to elevate the agriculture of our country ; and I believe that part of this education has come from this very impoverishment of the land, which has made it necessary ; just as in the future it will be seen that this great rebellion, which seemed about to destroy the Union, was necessary to show us our weak points and establish our Union on enduring foundations, and with more perfect guarantees for the liberties of our children. Providence orders all these things in this way ; and I have never lost my faith in that love of nature which is inherent in all men. I think I should mistrust that man who professed not to have a love of nature ; I should think him " fit for treasons, stratagems and spoils."

As to the connection of this Board with the college, I confess I do not have any fear. I believe that if we undertake to interfere with its management in any way, to dictate the method, we should do mischief inevitably ; but, as our worthy president has said, he comes to us for that aid and counsel which he has been with us long enough to know he will be sure to get according to our ability. He knows that when this matter of the establishment of the Agricultural College, as a separate institution or as connected with Harvard College, was debated in the Board of Agriculture, there was but one uniform expression, and that was, that we should take it up like an infant in arms, and nurse it into existence by our best efforts, without interference from the college. We have eminent men in this Board, capable of doing great service to the college in the way of lectures, which they will unquestionably be glad to do. I realize the difficulties which beset the beginning of this institution, the bringing it into the world, as well as my friend Perkins; but they do not discourage me at all. We have nothing in the past to guide us, to be sure; but this I think I know, that what it is possible for man to do can be done in Massachusetts; and since there has always been faith that this thing can be done—since there have been experiments made in Europe, adapted to their peculiar circumstances, which have been successful—we can see that it is only necessary to adapt this college to the circumstances of the case, in our country, to make it a success. If we say it will not succeed, we overwhelm it with doubt in the public mind immediately; and I think that has been said quite enough. But if we say, "We will take hold and help it succeed, and make it succeed," then success is assured. You have got the right man; you have got the good will of the legislature; you have certainly got the friendly aid and support of this Board of Agriculture; you have certainly got, on the part of the great public, an earnest desire to have the experiment succeed; and as against all that, you have only the fear that it may not succeed. Throw away fear and insist that it shall succeed.

There comes into my mind at this moment an illustration of what I have said in regard to education improving the farmer and making him love the farm, if he loves the land at all—if he takes farming for his profession. We have in the town of Concord a young man who was an artisan of such rare skill that he acquired property very fast. He wanted to be a farmer, and before buying a farm he went to Europe to qualify himself to be an intellectual farmer. He went to an Agricultural College there, and stayed two or three years, and after learning all he could learn there, he came back, and in the most quiet and unpretending manner went to farming like his neighbors; and on a farm of twenty-five acres he now supports four times as many cattle as the person he bought of, and two more cattle than any other farmer in Concord on the same number of acres. He does it by force of intelligence, by reason of the adaptation of means to ends, through the scientific methods which he has learned abroad in relation to agriculture. He quickens, you see, all that part of the town in which he lives; he quickens those men, reckoned successful before, to still further efforts to achieve yet higher success. They go to him to see how he does it, and he shows them his methods. There is not a particle of the valuable substances which are to so great an extent lost by other farmers in making manure lost by him; everything is saved; everything is applied with the utmost skill and intellect, and the result is astonishing. Yet he is only a young man. I think that instance shows that if, out of the twenty young men you educate in a year, there are two who go back to the farm, one in one place and one in another, you send out every year two apostles; and this influence will increase, until at last agriculture will be accepted to be (what we so well know it to be,) an intellectual pursuit. You see the process in the mind's eye, by the relation of cause and effect. Your scientific principles prevail whether you see them or not. When once the talk about the debasement of farming (falsely so called) ceases, it becomes an intellectual pursuit. Gentleman, follow it and you can talk about the processes of agriculture, the improvement of cattle, and all those things, just as we do now about bank stocks and other fashionable subjects. I have entire faith in the success of the Agricultural College.

Mr. PERKINS. I did not mean to intimate that the farmers of Massachusetts were deteriorating intellectually. I claim that the whole of Massachusetts is rising in intellect, and the farmers going up with the rest; but I did not mean to have it inferred that a well-educated man would be increasing his knowledge particularly by turning to farming again. I think our agricultural societies and our farmers' clubs in Berkshire have done wonders for our farmers. Wherever we have an agricultural club I can see it has improved our farmers in everything they have to do with.

Mr. DODGE. There is one idea that suggests itself to me in regard to this Agricultural College being placed so near to a literary college. It has been argued that this is a disadvantage. If there were any connection between the two, I think it would be; but this Agricultural College is entirely distinct from Amherst College. Governor Andrew, when this matter was broached, recommended a union of the Agricultural College with Harvard University, stating, what was very plausible indeed, that the Bussey farm, which was left to Harvard College for the purpose of establishing an agricultural department, might have an Agricultural College founded upon it. The governor urged very forcibly that the Agricultural College should be united with Harvard College, and the intention of the testator of that will carried out. But the legislature said no. They said so decidedly: "We will not be connected with that or any college." Well, there is an end of the matter. The next year I talked with Governor Andrew on the subject, and said, "It is a pity that thing could not be done." His reply was: "I recommended it to the legislature; I was beaten, and I know when I am beaten. It is impossible, with the temper of the legislature, to make a union with Harvard College or any other college." Now we are located at Amherst. The trustees made the best selection from the different farms that were offered them; and I will venture to say that no man on the Board will say that it was not the best selection as a farm. The best location, perhaps, would have been in Lexington, being in the centre of the population of the State; but the farm offered us in Lexington was very ill-adapted to the purposes of an Agricultural College on one account—it was a very sour, cold piece of land, full of rocks, and in no way adapted to the purposes of this college. Therefore they did not go there, or this was one of the reasons why they did not go there.

The objection is brought up by Mr. Perkins and other gentlemen that the location at Amherst is so near another college that the Agricultural College cannot flourish; and Mr. Perkins says that if it was established in a town where there was no college, you would get a large number of students from the local population. That is the very class of students we do not want to come in, because they would naturally go there to get an education for other purposes. Now, those who want to qualify themselves for other professions will go to Amherst College, and we shall get for the Agricultural College just such men as we want. I think the fact that there is another college so near will be an advantage. Amherst College will attract men in pursuit of a profession, and the Agricultural College will attract those who have a love for old mother earth, and are willing to live with her and die with her. God bless them! They will come—I know they will.

Professor Agassiz. I have been an advocate of the combination of the higher institutions of learning, whatever their character, because I believe it brings together a larger number of men who are endowed with higher powers, and that is for the good of those institutions; but I wish not to be understood as carrying these ideas of concentration to the lower schools. Concentration has its great advantages in the higher schools, because the number of capable teachers is not proportionate to the desirableness of those institutions. I will quote an example. The whole of Germany has not three persons equal to Liebig, and yet Germany has thirty-two universities. Then there are twenty-nine universities that have second-rate professors; and so it must be, necessarily, elsewhere. We have in the State of Massachusetts five colleges. Can you expect to have five professors of chemistry equal to Liebig? You cannot. Therefore it would be desirable, for the sake of higher instruction, that we had not so many colleges. That is my doctrine with reference to the higher branches of education; but when we come to elementary education and high schools we have not got enough, and those we have are too crowded, and in each of them the teachers have too many pupils. There the teacher has to do something more than merely give out what he knows, trusting that his hearers will take as much of it as they are capable of taking. He is actually to bring the young to understand how to learn; and to obtain that result the relation of the children to the teacher must be somewhat that of the children in a household to father and mother. There must not be more than the teacher can really educate; and most of our schools have twice as many scholars as can be properly taught by the teachers. I believe that one of the causes of the want of real and rapid progress in conformity with the demands of the age in our elementary schools arises from the fact that they are too few, that in each of them there are too many scholars, and that there are too few teachers.

Dr. Loring. I have occupied a good deal of the time of this meeting to-day, but on the matter of teachers I desire to say one word more. It seems to me we have allowed our minds to be led away a little this afternoon into those difficult questions which have somewhat agitated the State with regard to the location of the college, and which have disturbed the trustees of the property which was left the State for the purpose of building the college. I look upon all these matters as of minor importance. I think the trustees will manage in some way or other to get themselves out of their difficulties. They are sensible men ; they are practical men ; they have got but one thing at heart, and that is, the foundation of a college that will be in accordance with the tastes of Massachusetts, be creditable to themselves, and useful to our young men. I am therefore perfectly willing to overlook any difficult questions of that sort, and I am also disposed to take it for granted that the college is to be a useful thing, and may be made a good thing, and that, if necessary, without regard to its location. It seems to me that 400 acres of land in one place, if it is good land, is just about as good as 400 acres of land in another place, if you only plant upon that land just exactly the same amount of brain work in one place that you do in another. The fact that this institution is within a mile and a half of Amherst College does not involve it in the fate of Amherst College ; it does not establish the peculiar views of Amherst College ; it does not make it Amherst College in any way ; it simply indicates that the people of Amherst came forward and led the trustees to suppose that they could comply with the terms of their proposition better than any town in the Commonwealth. That seems to me to be the fact in regard to that question. For one, I should have been glad to have seen the college elsewhere, I am free to confess ; but I find no fault with Amherst ; I shall be perfectly willing to travel from here there ; and I do not want to throw any obstacle in the way of the establishment of the college. I am willing to overlook all this matter, for there is one thing which I think we can do, and ought to do. There is a sort of fraternity of literature—a fraternity of intelligence. It makes not the slightest difference whether it is agriculture, science, medicine, law, divinity, or what not ; there is that delightful community of scholars into which every educated man should desire to be introduced, and in the lowest ranks of which every man will find sympathy from those who sit in the highest seats of the synagogue. Now, that fraternity I desire to have established here in Massachusetts. I not only desire that the Agricultural College should be part and parcel of the great system of education in Massachusetts, so organized, that the boy, beginning in the primary schools, may pass on upward until he has fitted himself to do the work which God designed he should do, but I also desire that between us here and those in other countries who are endeavoring to investigate these abstruse and difficult questions, there should also be fraternity of feeling. We should establish this fraternity at once. We have not established it as yet, in that branch of business which we have adopted as a profession, and which has occupied as much thought as any profession in the world. We have all read the valuable works on farming which are prepared by our own thinkers and writers; but what I said this morning is especially true—we have it in our power, through the instrumentality of this Agricultural College, to elevate the standard of our agricultural literature, until it shall range alongside of that foreign literature which appears in the transactions of foreign agricultural societies, and which constitutes a part of the scientific knowledge of the world. We can do it; we ought to do it. If we will but faithfully apply ourselves to the work of guiding this college, wherever it may be located, in the right way, we may establish a telegraphic wire between Massachusetts and the best chemists, the best savans, the best scientific men, in England, France and Germany, which will be worth all the wires which will ever be laid beneath the waves of the Atlantic Ocean. It will put us into immediate and active communication with those men, and will open the door for every farmer's boy, if he will but avail himself of the liberty to pass on through the primary portions of his study up to those heights which are not reached by more than one Liebig, perhaps, in a generation, but which he should ever strive to attain. We have been told that there are thirty colleges in Germany, and only one professor like Liebig. Heaven knows how many colleges there are in the United States, but there is but one Agassiz, (applause,) and we did not raise him ourselves. (Laughter.) Let me tell you, gentlemen, the only way for Massachusetts to make a Liebig or an Agassiz is for her to go to work now, and keep at work until she has accomplished the object. It may not crop out in the medical profession, where we have so abundant means of teaching; and yet we have Warren, and Jackson, and Holmes; we have nearly reached the acme. It may not crop out in law; but we have got pretty near it; Shaw, Story, Choate—we need not tremble before other States or nations. It may not crop out in divinity, but we have come pretty near it—Ware, Woods, Stearns, and others. It may not crop out in science, but we have not tried it yet. Now, I propose that the brain-work of Massachusetts should go at this business, and the same power that has produced these distinguished men in other professions, may possibly develop, in connection with the Agricultural College, some natural historian who will do honor to his State and shed light throughout the world. I do not despair. I am sure that, if the farmers of Massachusetts will turn their attention to the work, they may accomplish what I have already alluded to—that fraternity of literature, intelligence and science, the highest free-masonry on earth ; and they may bring forth for us the men that we want in this profession. We can get them in no other way. Now, I have taken that point. I think it is worth toiling for and working for, and I am willing to do what I can, in my small way, to accomplish it.

One word in regard to another matter. Let no man suppose that we are raising scholars, farmers or teachers for the West. We want them here. This is the best missionary ground I know of. For while our mills, shops, banks and all mechanic arts have succeeded—while we have built cities from one end of the State to the other—built railroads and bored through mountains—filled up valleys and pulled down hills—we have all the time been saying that agriculture was an inferior occupation, and one in which the sons of Massachusetts must seek for wealth abroad. Now, we have got at least one small agricultural school already in Essex County ; it is not a large one ; there is but one scholar and one teacher ; but he has studied and worked until he knows all about it. He has been living in Illinois, on the fat lands of the West, and he came home to Massachusetts, disgusted with Western agriculture, to apply himself to the soil of the old Bay State. He told me last Friday night that he could raise better crops on a hill within two miles of Lawrence than on what are called the rich, fat lands within two miles of Chicago. He showed me his crops, and proved to a demonstration that a careful application of the principles of agriculture, which he had reduced to a science, was of more value to him on a pine barren, almost, than anything he had been able to accomplish within two miles of Chicago, with all the agricultural fame of Illinois behind him. I ask the people of Massachusetts to remember that; and when they know that this man can raise $900 worth of cabbages to an acre, which he could not do in Illinois; when they know that he has succeeded in producing, by a mingling of different varieties, cabbages that exceed any that were ever produced before, by his own diligence and discretion; when they know this, they must recognize that industry, intelligence and skill may be applied just as well on these lands as to the richer lands of the West. I would have this remembered, because, let me tell you, that there is no State in this Union—and I have travelled through almost all of them, Virginia, Pennsylvania, with her rich valleys, New York, fertile as she is—there is no State in which a man can devote himself to the specific branch of agriculture, with all the powers which God has bestowed upon him, so well as here in Massachusetts. You have a city for a market within almost every twenty square miles; you have an industrious, wealthy population; you have every variety of soil; you have every opportunity to make this State as good an agricultural district as the Moors made Spain, or the Romans ever made of Italian valleys. Now, why go abroad? There is no occasion for it. Let us take it for granted that there is as good an opportunity for intelligent farming here as anywhere, and turn our attention to our own soils and grasses, and I think we shall get along full as well as if we emigrated to the West. We here in Essex County have done a little. Last autumn I was in New York State, surrounded by all the agricultural wealth of that great Mohawk Valley, speaking to the people there in the open air upon practical and scientific agriculture; and it occurred to me what was going on at home. I said, if they would excuse me, I would tell them that in the little county of Essex, rock-bound, abandoned to the north-east winds until it seemed to be stunted in all its vegetable growth, men had produced, in the first place, out of the industry and skill of their practical farming, the best formed and most productive onion that could be grown for market; in the same way they had improved the cultivation of the cabbage until they had bred the stone mason; in the same way a young man in Salem, throwing all the theories of hybridization to the winds, had, on the land of a little garden, grown the best table grape in the world. All that, I said, had been done by careful, industrious and capable farmers, and I wished to remind them that so much could be done upon such a narrow corner of Massachusetts as this. Now, I bring these facts to your minds to show you that we can carry on the business of farming, and carry it on well, here at home; and the better educated we are, the closer our alliance is with the distinguished men abroad who are engaged in the same business, the better will be our agricultural education, and the better will be our agriculture.

Adjourned to meet at 7½ o'clock, P. M.

EVENING SESSION.

The Board met at the hour appointed, when a lecture was delivered on the

VARIETIES IN PLANTS.

BY PROF. P. A. CHADBOURNE.

Gentlemen: When I last had the honor of addressing this Board, I spoke on the *Relation of Plants to the World*—to soil, climate, and to our place in the solar system. I also spoke of the relation of plants to the animal kingdom, especially of that curious relation by which plants seem to respond to the instinct of certain animals, providing, by a fixed law of growth, both shelter and food for many of their insect enemies. We should certainly expect that they would respond as fully to the intellect of man. And I propose to treat to-night of the *final cause* of varieties. There seems to be in every plant what may be called the *creative idea*—that is, a certain purpose, often dimly sketched in the wild plant, but which is more perfectly developed by all the changes produced by cultivation. And while this development under cultivation may give rise to an untold number of forms, as in the case of apples and other fruits, this leading idea is never lost. While the species unfolds itself in the production of varieties, there seems to be a line beyond which it cannot go. Of this fact, our cultivated plants, so long the companions of man, are the best proof.

Accepting, then, the common definition of varieties in the organic kingdom, we regard them as forms produced by the variation of species. The cause of this variation has never been explained. It was formerly referred to soil and climate; but probably the only account that will ever be given is: such is the nature of species. It is a law written on the plant and animal, that in their development there shall be variation from the original stock, but only in certain directions. On this point we quote the language of a distinguished scientific man who has lately written much upon this subject. It would be difficult to find, in the writings of any other author, all that we really know on this subject, condensed into so few words:—

> "The former [*variation*] has never yet been shown to have its cause in 'external influences,' nor to occur at random. As we have elsewhere insisted, if not inexplicable, it has never been explained; all that we can yet say is, that plants and animals are prone to vary, and that some conditions favor variations." *

We thus confess our ignorance of the natural causes that produce variation. We propose to discuss its *final cause*. This implies that there is in it a purpose. If there is in the variation of objects in nature a purpose, that purpose must have relation to the objects themselves, or to some other beings connected with them or in some way related to them. Our special object will be to show that all variation from original forms in the animal and vegetable kingdoms is not in general for the good of the object in which it occurs, but for the good of other objects in some way related to it. We think it will readily appear to any careful observer, that much of the variation in both of these kingdoms has special reference to man as an intellectual and moral being. But we shall, for want of time, confine our present examination mainly to plants.

For what purpose are the petals of the flower, the crown of beauty to the plant? Certainly they are not absolutely essential in the production of seed, for many plants are without them. And if in any case they are deemed essential, certainly the beautiful pattern of the petal, its numberless modifications and delicate tints, adjusted with masterly accuracy, are not necessary parts in the economy of plants. Of what use to the plant is that row of sterile flowers that adorns so many of our compositæ, the Rudbeckias and helianths, or that curious circle of sterile flowers bordering the cymes of hydrangeas and some of our viburnums? We may be told that they have no use, or that these apparently useless parts will at some time be found to be of importance in the economy of the plant, aiding directly or indirectly in the perpetuation of the species.

* Professor Asa Gray.

We will go one step further, then, and ask: What end is subserved by double flowers? All agree that one use of the flower is to produce seed. But the perfectly double flower loses the organs of reproduction. The rose unfolds its stamens and pistils into petals, and thus gains in beauty till it becomes the perfection of a flower, but always at the expense of seed. What use, in the economy of the plant, does the flower subserve when it can no longer produce seed? It does not perpetuate the species, so that this variation cannot be for the production of new species; and more than this, it is a draft upon the nutriment that would otherwise go to build up the plant that produces it. By becoming double the flower has ceased to be of advantage either to the species or the individual plant. But does Nature thus defeat her own ends, and provide for the destruction of some species by the very law of their growth? Not at all. In every plant which by cultivation is so far changed as to lose the power of producing seed, there is some other provision for the propagation of the plant, as by slips, by grafting, by bublets, and the like. Nature seems thus to provide, in the structure of other parts of these plants, for the development of their flowers in the line of beauty at the expense of seed. And when annual plants. become double, they at the same time become perennial.

Let us examine another group of plants, belonging to the same natural order as the rose. For what purpose is the fruit of the apple-tree, the pear-tree and the peach? Their seed is evidently for the propagation of the species. But still we ask: For what purpose are the *apple* and the *peach?* The germ is in the seed, or within the stone. The economy of the plant does not require that the covering of the seeds should be increased in quantity or heightened in flavor, for the seeds come to their fullest development in the unchanged native fruit. If the improvement in size and flavor is not for the seed, it has no relation to the plant. And probably no candid person will contend that the change in cultivated fruits, which renders them more valuable to man, has any more relation to the wants of the individual plant, or of the species, than the milk of the mother has to her own wants. If this change has any purpose at all it is for something outside of the plant. The seed is not for the plant that produces it, but for the species. The change of covering, as already indicated, is of no advantage to the seed. Its increase in size is therefore a draft upon the tree, without having any relation to the species. So far as the economy of the plant is concerned, it is a mistake. The machinery is out of order. There is an absolute throwing away of material and of vital energy. And this goes on, as in some oranges and grapes, till no seeds are formed.

We are now prepared to introduce and illustrate certain propositions, which seem warranted by plant development:

1. In some plants the idea of beauty is the most prominent idea, inasmuch as under the best cultivation the variation of these plants is always in the line of beauty, either in the leaf or flower. The beauty of the flower—the rose, for example—often increases at the expense of the reproductive organs, until the power of producing seed is lost.

2. In other plants, utility of fruit is the prominent idea, as in the apple and the peach. Such plants, under careful cultivation, produce larger and more delicious kinds of fruit, without increase of beauty in the flower.

3. From these two propositions another follows: That the plants best known to us from long-continued cultivation can be readily divided into two great series, without reference to their botanical relationship, but according to their lines of development. In one series *utility of fruit* is the prominent idea, and in the other *beauty of flower;* as under the best cultivation these series are developed in these two directions respectively.

The idea of utility is not manifested by fruit alone. The sugar of the sugar-cane constitutes its utility, while that of the Indian corn lies in its grain. These plants, so nearly allied botanically, are developed in these two directions, according to the leading idea in their products. The apple and the rose, already referred to, belong to the same botanical family, yet they are developed, in nearly all their variations, in opposite directions. The potato has, for its leading idea, the formation of underground stems or tubers; while its brother, the tomato, has for its idea the production of a fruit corresponding in structure to the potato-grape. They show this in all their variations. In the pine tree the leading idea is wood, and in the mint, essential oil. But in such plants as do not readily produce varieties the line of development is determined with difficulty.

4. Some plants in their native state give indications of the kind of change likely to take place in them by cultivation. The rose, for example, by its large corolla in comparison with the fruit, shows that change of flower is most likely to take place. In the apple, the large fleshy fruit indicates a tendency to variation and improvement in that direction. The viburnam opulus, the hydrangea, and other plants, by the circle of sterile flowers, much larger and more beautiful than the fertile flowers, indicate change in the direction of beauty. These beautiful circles of sterile flowers in some of our native shrubs, and the neutral rays of some of our compositæ, may be regarded as ornaments, rather than as of use, in the economy of the plant. When, therefore, a new plant is brought under cultivation, there is little doubt in what direction it will vary, if at all.

5. Those plants that by variation lose the power of producing seed, can always be propagated in other ways, as by slips or bulbs. Nature, as though careful for the preservation of the species, never allows any plant, by its own law of growth, to lose the power of producing seed, unless she has given to it means other than the seed for the perpetuation of its kind.

6. Variation is most common and rapid in those plants which are most useful to man for cultivation, and which must go with him over most of the earth. It may be said that they are most useful because they happen to vary. But their readiness to vary certainly was not the cause of their first cultivation. They were selected for some particular good, as for fruit, or for beauty of flower, or some other useful property. The characteristic for which each one was first selected was the leading idea of the plant, and in that direction all its variations under cultivation have tended. The rose, in all its varieties, is to-day cultivated for the same reason for which it was first cultivated—for its beauty; the apple-tree for its fruit; the sugar-cane for its sweetness; and so on through the list of cultivated plants.

We might multiply propositions and examples, if our space allowed. As they would not differ in kind they are not needed for the argument. Apparent exceptions to the propositions already stated may undoubtedly be pointed out, for it is well understood by naturalists that Nature does nothing *per saltum*. Hardly a group of plants can be examined in which there will not be found one or more that the family description will not embrace in all particulars. There are also some plants so valuable for several purposes that it would be difficult to determine in every case the leading idea. They are made for a double purpose, and may develop in either direction. The apple-tree with double blossoms, or the tomato with tubers upon it, would not, therefore, with any candid person, affect the bearing of the propositions. If a law of nature is really discovered, all exceptions are either merely apparent, or if real, are found to be special provisions for some wise purpose. It is the general law of variation that we now wish to present for consideration in the propositions just enunciated. If these propositions have any significance, to what do they tend? Certainly to show that the vegetable kingdom is not an end to itself. Men and animals do not make use of plants because they happen to be what they are; but the plants are constituted as they are for the sake of the animal kingdom, and many of them with direct reference to man as an intellectual and moral being. It is by the law of variation of species that they are most perfectly fitted for these high purposes.

In almost every department of plant life the changes can be referred primarily to the good of the plant itself; and thus it is easy to say, and no doubt easy for some to believe, that there is in them no purpose other than the continuance of the species, if any purpose at all. The cereals—wheat, rye, barley, Indian corn and rice—furnish the great bulk of food for the human race. We have no doubt that most men will believe that they were made for this purpose, and not that they happened to be what they are, or that the primary object in importance was that they might propagate their kind, and that the support of animal life was no part of the plan, but accidental or subsidiary.

Yet there is much that seems to favor the theory that all the machinery of fruiting is for the continuance of the species alone. If the germ fails to be fertilized by the pollen, no sugar nor starch nor gluten is stored up in the seed for man. But when the pollen has touched the germ, there is power of independent life, and from that moment all the energies of the plant are taxed to store the kernel with food. But food for what? for whom? For the young plant, all agree. It puts in the seed the food which that germ needs for its support, till its roots and leaves are large enough to collect from the earth and air the crude materials and elaborate them for use. For what purpose is the starch garnered up in the potato, and the sugar in the beet, the carrot and the parsnip? We shall be told that they are stored up for the plants themselves, to supply the great draft made upon them in producing fruit. We cannot deny it, nor do we wish to do so. We love to contemplate the parent plant providing for every one of the thousand plantlets folded in its seeds, destined to beautify the earth when its own withered stalk has passed away. Would that men might learn a lesson from it, and provide for their offspring enough, and only enough, for their wants till able to provide for themselves. We can hardly help admiring the seeming prudence of the honest beet and parsnip, that industriously gather stores of food the first year for the flowering time, when both root and leaves would fail to supply their wants. In all these things we have been compelled to recognize a wisdom and a skill that thus arranged this machinery of the plant.

But in the very arrangement for the plant itself there seems to shine forth a higher and nobler purpose. In the multitude of seeds, an apparent waste of energy, there seems to be a provision for their legitimate destruction by a higher creation. And if the grain of wheat fails to fill unless the germ is there, who does not see that it is better for man that it should be so? It is best for him that every grain of wheat should represent both so much food, and also a certain centre of new plant life. With what uncertainty would the husbandman sow his field, if perchance only one in a thousand of the precious grains scattered on the furrow would give the green blade, and, in time of harvest, the full ear! He who regards the support of animal life as the highest use of the vegetable kingdom, must also see that certainty of propagation is of prime importance in the plants already mentioned.

But we have perhaps too far prolonged this discussion on this lower phase of plant-life—the production of food. We readily grant that in the majority of cases the food for animals is produced in a way that seems primarily for the benefit of the plant as an individual or species. To some it may appear to be prepared solely for the plant. To this, however, we think there are plain exceptions; and among them we mention our soft fruits, which are the envelope or mere accompaniment of the seed. The seeds need a covering, it is true. But why should the covering of the apple-seed give the thousand kinds of this delicious fruit, of every tint and flavor, and varied time of ripening? Why do the pear and peach vie with the apple in the diversified forms and flavors they offer? Why does the strawberry enlarge its receptacle into that most delicious fruit? Why does the grape bury its seeds in such a luscious pulp, and sometimes form the pulp without the seed? That the perfection and variety of the soft portion of such fruits play any part in the economy of the plant, no one will probably contend. The pulp of the grape represents to man so much food. If it forms without seed, it is the cause of no indirect injury, as the filling of wheat grains without the germ would be, because it never represents new plant-life. If the soft fruits have no purpose except to cover the seed, their increase in size and improvement in flavor are a mistake. The native apple, in all its harshness; the frost grapes, which the animals allow to fall with their seeds untouched, unless driven to eat them or starve; the peach, in its hard covering, and the button-pear, which no cooking can fully conquer: all these are for the plant the perfection of fruits. Such fruits perfect and protect their seeds. But our Black Hamburghs and Sweetwaters, our Pippins and Bartletts, are mistakes, and evidences of want of creative design in such plants, if they have no end out of themselves; for all these variations from the original stock either weaken the seed or invite to its destruction. Because they are of no advantage to the plant, must we grant that they are are a mistake or without significance? By no means. Nor do we think it possible for the majority of men ever to believe that we have not here a direct provision for the animal kingdom as a whole, and for man in particular; a provision that shows wisdom, though through it plant-life is made entirely secondary. The continuance of each species of plants must be provided for by some means, or its creation would be a failure. This being done, sometimes by one method and sometimes by another, all the remaining parts of the plant may be modified for the benefit of this higher kingdom. It seems to us that all these modifications indicate this ulterior purpose, to which the interests of the plant, so to speak, are made to yield. We have no doubt, indeed, the three kingdoms of nature are all arranged with reference to man, especially as an intellectual and moral being. We never could see how the plan of structure, the whole science of homologies in the animal and vegetable kingdoms, could be fully comprehended by any one without the recognition of a direct provision for man as an intellectual being. Animals and plants are constructed with parts apparently for no other purpose than to show their true place in the organic kingdom. We believe that they were thus linked together by homologous parts that they might be comprehended by man, that he might more surely trace the plan of the Great Architect. We believe this, also, without reference to the question whether these parts came to be as they are through secondary causes or by direct creation.

In the provision made for the increase of beauty in the flower by doubling, there is certainly no reference to the welfare of the plant, for beauty increases at the expense of the seed, the final cause, or one use of the flower, as all will allow. When we see this tendency to variation in such a multitude of flowers; when we see it confined to those plants having methods of propagation other than the seed; when we see this tendency conferring no possible benefit upon the individual plant nor upon the species; when we see what a source of enjoyment this law is to a man in his highest cultivation—we might say, how necessary for that highest cultivation—can we doubt for what purpose this law of variation was given? Who can fail to feel that the plant is not for itself? but so far as it seems to be for itself it is simply that it may exist; but it exists for a higher kingdom; and that the final cause of plant variation is found mainly in the wants of man, not only as a physical, but also as an intellectual being.

There is another significance of varieties besides their adaptation to these wants of man, although to some it may seem a mere accident. We refer to the conditions thus presented to man for continual progress. In consequence of this wonderful law of varieties there is opened the possibility of continued improvement; to reach the limit of this improvement is impossible. Were it true that each species produced from age to age the same identical form, without the possibility of variation and improvement, whenever each species was secured, all would be done that could be done in that direction. We have but one species of apple. From this have been produced hundreds of distinct kinds. There might, indeed, have been as many distinct species created in the beginning. But even then, all that could be done would be to secure the kinds created. In consequence of this wonderful law, the same end is reached as in the creation of numberless distinct species, and in a manner far better for man. From one species have sprung unnumbered forms. The next year may produce others still more desirable, and the next year others still more desirable, and the next year others, and so on forever. It is impossible for man to say that he has now the most delicious apple, peach or pear, or the most beautiful rose, or the most prolific variety of corn possible. The next year a better apple, a more beautiful rose, a more prolific variety of corn, may be produced, and this shall be true forever. There is thus laid in this law of the animal and vegetable kingdoms the surest conditions of continued progress in man. The possibility of better forms is ever saying to him, Onward! Upward!

In thus viewing the law of variations in all its manifestations, we have forced upon us the conviction that, while it sometimes has reference undoubtedly to the plant or animal itself in the preservation of the species; in its higher manifestations, especially in the vegetable kingdom, it is for something out of the plant, and for a higher creation—the animal kingdom; above all, for man as a rational creature.

The subject of variations, which we have been discussing, has given rise to the development theory. We accept the facts of variation and the influence of "natural selection," but not the inferences that are drawn from them.

We see the need of variation for the best good of the world, for man himself. If provided for in the creation of certain species, and those species most useful to man, we see in this a mark of wisdom, as much as in the adaptation of the parts of our bodies to each other, or of our bodies to the external world. We regard, then, the law of variation as a means of preserving the species under certain circumstances, and as a means of better fitting created things for their various uses, and not as the creator of the thing, nor in any sense the originator of the species. Variation is the *quality* of a species, and not its *producer*. Varieties simply unfold and exhibit the creative idea in the species. We see nothing yet to shake this belief. But if the lessons we have learned from geology and living forms are to be modified or proved to be mistakes, we will welcome the new light. It will not be hard to change opinion in such goodly company.

Professor AGASSIZ was then introduced, and spoke as follows:

ADDRESS OF PROFESSOR AGASSIZ.

The address you have just heard has turned my thoughts so completely in that direction, that, if I were to follow my first intention, I should speak without thinking very earnestly of what I was saying. I ask your indulgence, therefore, if I take up the subject where Professor Chadbourne has left it, and add to what he has said a few considerations derived from the animal kingdom, which have a similar significance, and have also their application in reference to agriculture.

This practical business of cultivating the ground and raising plants for special purposes is an awful fact to theorists. This practical business of life, as was well said this morning, in the opening address to the Board, is the test of all doctrines and of all theories; and those theories, however well supported, which cannot stand that test, have all to go by the board. I look forward to the experience of the farmer to give to science the means of advancing in the direction which is at this moment hampered by mere theories. We cannot deal either with animals or plants practically without knowing their nature; we cannot cultivate a crop without knowing the character of the plants which produce the crop; we cannot raise stock without knowing the nature, the habits and disposition of the species of animals which has been so brought into a state of domesticity; and it is, therefore, a practical question, which at once touches theoretical views, in the present state of our science, to know what are the relations of these things which we grow, or which we domesticate to one another, and all those things which are not yet brought under domestication or culture, but which, in their relations to the others, show such an affinity that an attempt at cultivation or domestication may be possible.

In order fully to understand this subject, we have to deal at once with an abstract question—that of species; to consider whether there is such a thing in nature as species or not; to consider what are the things which we call varieties in our gardens, on our farms, or in our stables; and how these varieties compare with what scientific men call species. And here let me request you to distinguish between the sense of the word "species," as it is used in science, and the vernacular use of the word, by which any different thing, whatever may be the nature of the thing, may be called a species of that thing or another thing. That is not the meaning in which science uses the word species. The word species in natural history designates a certain kind of existence which is definite, and applies to animals and plants having certain properties; for instance, that of reproducing themselves with the same essential characteristics. That is a species; and at once the question arises: Where are the limits of species, and what constitutes variety? and how are species derived, how is variety produced, and is it possible to originate new species by the development of varieties?

If it were possible to originate new species by the development of varieties, you see at once that man might be able to enlarge both the animal and vegetable kingdom, and become a creator. And the doctrine is at this moment very generally received throughout the scientific world, and actually maintained, that not only man, but those general influences which act in nature as the stimulants to the growth of animals and plants, may so modify any living being, animal or plant, which has once had an existence, as to change its essential nature, and bring out, in consequence of those influences, new forms, so permanent, so distinct, and so essentially different from those that existed before, that they should be considered like species; that, in fact, in that way, all the variety in nature has been produced, and that original creation amounted to nothing but giving an impulse to life; so that, life being once called into existence, all this variety has been derived in that way, by successive influences of secondary causes. That is the doctrine; and that being the case, we are of course the lineal descendants of monkeys; the monkeys the lineal descendants of the next lower race of quadrupeds, and these the lineal descendants of lower and lower beings, and we come at last to the assumption that there was at the beginning a very simple form of life called into existence, from which has sprung all these diversities. And this mode of argument is legitimate, as soon as you tell us that you can produce something different from what there is primitively and naturally in the plant you cultivate or in the animal you raise. But if you tell us that you develop only such properties as are inherent in the plant, as are inherent in the nature of the animal, and that you add nothing essentially new, then that doctrine is at once repudiated. You see, therefore, that some of the most important problems that enter into the decision of questions of abstract science are left for you to work out. Only let the farmer, when he goes to work to examine his proofs, do it with a particular knowledge of what he is to report upon in reference to this question. If he tells us that he can raise wheat out of oats, that he can raise corn out of rice, that he can raise hemp out of nettles, then he will have shown just what the doctrine of transmutation assumes; but if, on the contrary, the farmer tells us that he is ever moving in a circle, which is returning upon itself, and that within that circle there is, in one case, nothing but apples, in another nothing but pears, in another nothing but cherries, in another nothing but grapes, in another nothing but wheat, in another nothing but corn, however great the varieties of corn, the varieties of apples, and so on, may be, then, he tells us that he does not make species, but only unfolds to the utmost all their inherent properties.

You see, then, how important it is for us scientific men to have the aid of this powerful machinery, which has worked for ages past, and is to work for ages to come, as the generations of men need food and protection. From that machinery we are going to receive all the information we need to test this question, and it is not difficult to see how it is going to be settled; because I do not suppose that by any particular witchcraft agriculture is to do in the next five years very materially different things from what it has done before. I do not think that in order to support a chance doctrine, which has for the moment bewildered the imagination of otherwise sober observers, or to gratify them we shall have to sow, hereafter, one thing in order to reap another. And yet how long has this practice of agriculture been going on? So long that nobody really knows the origin of these cultivated plants. It is lost in the darkness of past ages. We do not know them in a wild state. They were probably originated with a view of being at once the companions and supporters of man; and so well has that design been carried out, that man, in trying to find them, does not recognize them among the wild plants. I take it we have there one of those indications which prejudges, as it were, the whole result to which I am alluding, by assuring us that what has been the case in former ages will continue to be so; that an improved agriculture is no more to produce another kind of thing from one kind of seed than has been the case; and as long as agriculture is not to be so transformed, but only improved, we shall not have from agriculture evidence of the correctness of the Darwinian doctrine; we shall have no support for this transmutation theory from it, but only a succession of severe blows, which are coming so rapidly that I trust the doctrine will not live much longer. But it lives now, and lives with a tenacity, a vivacity and a pugnacity which are quite remarkable; and we must meet it with no other spirit than that of trying to know the truth. I hail with delight every new production from that school, because it will run its course quicker. I wish its ablest representatives to come out strong and fast, because it will the sooner have presented its whole strength. And so it is with all excitement —the sooner it comes to a climax the sooner is the fever over.

But, gentlemen, I do not speak with the intention of ridiculing these men and their doings. They have produced remarkable works; and none so beautiful, none so extensive, none so thorough, as the works of the very head man of the transmutation doctrine. Few naturalists have equal powers with Darwin; few naturalists are so thorough as he; few naturalists are more conscientious in their researches. I know him well, and I respect him; but I believe he is wrong in his interpretations of nature and the facts, and that is the reason why I hope that his followers, who are the exaggerators of what he has done, who, like all extreme sectarians who run into fanaticism, overdo the thing in such a way as to make it ridiculous,—that is the reason why I hope they may be met and silenced. That is just the point where we are; and as evidence that I am not painting my picture in too strong colors, I will tell you what has lately been published. A German professor, Heakel, who is director of the Museum of the University of Vienna, a thorough naturalist, perfectly conversant with the whole animal kingdom, who has published interesting investigations upon embryological topics, and upon matters connected with comparative anatomy and zoölogy, has within a few months published a work on the distribution of the animal kingdom from four primitive types. That work is quite recent; I have not had it more than a week, but I have appropriated its contents as rapidly as I could in order to see what its merit is. I see that he is perfectly conversant with the structure of animals and their relations to one another, and he has taken his knowledge of the affinities of animals—that is, the relation arising from similarity of structure —as the test of their genealogical resemblance to one another. Let me explain, lest this should be misunderstood. We know two kinds of relations very well. We know what is parentage—the relation derived from the genealogical connection of a succession of individuals—and genealogical trees give us the order of succession of animals approaching very near the primitive stock; and genealogical trees are legitimate subjects of historical investigation, and the more of them we have that are accurate, the better for our precise knowledge of our relationship to one another in that way. There is another kind of relation which exists in the animal kingdom and in the vegetable kingdom also; it is a similarity determined by a community of structural characteristics. For instance: all the fishes are related to each other by the nature of their backbone, by the nature of their fins, by the nature of their scales; in fact, by all those structural peculiarities which make fishes to be fishes, and so to belong to one class. So there is an affinity between all birds. The duck, the heron, the sparrow, the parrot, though so widely different from one another, and living in different parts of the world, have an affinity to one another by all those traits of structure which constitute the bird a bird—that is, the representative of one class. Now, whence do these traits of affinity come? What is their cause? It is a thing which is a fact; we have it before us; and that fact is the primary fact of our scientific research. We have not been able to account for it; we have no explanation for it, other than that it is a fact founded in the creation or in the nature of these things. Now the supporters of the transmutation theory tell us: "We know better. We know whence affinity comes. It is the result of a common parentage, of a common descent; and if the parrot and the heron and the goose have an affinity with one another, it is because they are all descended from a common bird-like ancestor, which was neither parrot, nor heron, nor goose, but which was an animal capable of producing these things in course of time. And if all quadrupeds are related to one another, it is for the same cause; and if there is a certain relation between men and monkeys and quadrupeds and birds and reptiles, and so on, it is because all these animals have a certain common ancestry." This is the doctrine of that school, and it is by the facility with which they apparently explain everything that they have received the applause of the whole world almost, and that they are now welcomed everywhere as the true expounders of nature, and as giving satisfactory explanations of facts of which the naturalists who have preceded could give no account.

Now, this man Heakel starts from that point: that affinity is evidence of a common descent, and therefore, as he knows the affinities of animals from all his investigations as well as anybody else, he draws a genealogical tree, not only of the whole animal kingdom, but of each class in particular. He tells us which is the primary stock of polyps; what are the successive kinds of polyps which have descended from the first; and he says these second have descended from the first in virtue of their resemblance to them; and that these third have descended from the first, he affirms, on the ground of their great resemblance, affinity being all the way to him the guide by which he builds up his genealogical trees. He has done that, not only for the polyps, but for jelly-fishes, star-fishes, sea-urchins, for all the zoöphytes, for the worms, for the crustacea, for insects, fishes, birds, the mammalia, and for the mammalia through the series, so that he tells us from what kind of animal man is derived: and his assertion is, that he comes from a monkey-like animal, the remains of which were detected, a certain number of years ago, *in Greece*. This is all very plausible; and what is there to be said against it? I would ask plainly that: What can be said against it? Here is a man who brings his whole knowledge of science, the whole knowledge of the age, (for it is not his knowledge; he takes the knowledge of everybody else, as he has a right to do, as a part of his own, because he is one of the representatives of science;) here is a man, I say, who brings the whole knowledge of the age to his aid, and he tells us, assuming genealogy, assuming affinity, to be derived from common descent, "Here is my genealogical tree—what have you got to say against it?" And when I first looked at it, I said, "There is nothing to be said. These animals are related so. Our science is transformed like magic by the mere substitution of the word 'affinity' for 'parentage,' and we have got an explanation of everything. You bring down the whole animal creation, from the simplest form, to man, as the head of it, and all that is done by external influences merely; there is no Creator in the matter."

But then, looking at these genealogical tables critically, I saw there was something to be said. Science tests every statement critically. It is not by talking and crying against a doctrine, that you overturn it, because special pleading can be carried far for a good as well as for a bad cause; and for a bad cause sometimes better than for a good cause; because there is much to be said in order to make it appear plausible. Therefore, special pleading will not do; and I am not going to enter into an argument against the transmutation theory, believing it would be of no use. It would neither restrain those who are now in it, nor prevent those who have a tendency that way from going into it; nor would it correct any false statement. I am going to look at these genealogical trees; and I have already examined them very critically. They represent the natural affinity among animals, and if affinity is the synonomous expression for common descent, they give us the true mode of development, the true successive descent of animals from one another. But geology is also a branch of human knowledge, a branch which has already ascertained a certain amount of facts, and among these facts stand very prominently those which bear upon the time at which the different types of the animal kingdom and of the vegetable kingdom have been called into existence. We know now that there was a time when there existed no quadrupeds; we know now there was a time when there existed no monkeys: we know there was a time, prior to that, when no animals of a lower type existed; and therefore we know the chronology of the animal kingdom, and of the vegetable kingdom tolerably well, as far as fossil remains—that is, remains of animals and plants, which are buried in the strata forming the crust of our earth—are concerned. As far as they have been gathered, we know, from the positions which they occupy in the beds, what is their chronology. Understand me, when I speak of their chronology, I do not pretend to say that we know how many hundreds of thousands of years ago these different kinds of beings lived on the earth; but we know which is the elder and the younger, which is far more important than the date, which would only burden the memory with an immense number of high figures. If we were to know that the mastodon lived so many hundreds of thousands of years ago, and the thesaurus lived so many millions of years ago, and so on, that would only burden the memory with a load of figures, which would have no great value in reference to anything which should express geological terms; but if we know that the thesaurus existed before the mastodon, that is a thing easily remembered, and gives us an idea of the sequence of the times when these animals have been called into existence, and have lived upon the earth. And let me say here, that it is a very interesting fact to find that all those families of animals from which man has received his most trusted companions, and the most useful members of the agricultural community, are of recent date. There is not one of them which belong to families that were represented on earth, during the times when coals were formed, or when the Jurassic mountains were accumulating; neither is there a trace of a plant, which is akin to those from which we derive our grains, our fruits and our wines, before the coals. All these plants are nearly contemporaneous with man, in the history of the earth; and if there are a few which are somewhat older, their antiquity is not much greater, and all point in that way to the whole plan of creation—to a term bearing upon the coming of humanity, and to the purpose for which man is upon the earth—the progress and development of mind over matter. But let me now return to the statement of Professor Heakel, in reference to the order of succession of animals. I have taken these tables of the order of succession for one class, and for the other, and I have compared the relative dates of the appearance of animals upon the earth, with these genealogical trees. And what do I find? Geology tells us that the grandchildren are their own ancestors! That is to say, that what this man, basing his position upon his knowledge of affinities among animals, pretends to be the descent of a certain time, geology knows to have existed long before; and that those which, according to this doctrine, that affinity is identical with common descent, are of very ancient date, have only come in at a very recent period.

So that the whole theory must fall before one critical glance; for the whole is nothing but a combination of anachronisms, out of which a genealogical tree is made.

The audience having been dismissed, Professor Agassiz, at the request of several members of the Board, made a few remarks in reference to the general topic on which he had proposed at first to speak. He said:—

If it is in order, gentlemen, I will state what are the leading topics which it has been my desire to lay before the Board, and which I felt a delicacy in approaching, when I saw that the audience contained ladies. This is the question: The proper relation between the sexes among our domesticated animals, with a view to improving the breeds. While in Brazil, I was surprised at the inferiority of the breeds. There are no pure breeds of any kinds, from the horses down to the dogs; and there is nothing more disgusting than to see the variety of dogs which are met with all over the empire. So great is the contrast, that I could not but ask myself, what is the cause of this? Is it a matter of climate, or what is it? Why are the dogs throughout the whole of that empire so wretchedly mean and bad, and why is there not a single animal that you would point out as a noble animal, representing in some way the idea that we have of a noble, faithful dog? Why do you not see such a creature there? I was very soon satisfied that the cause was not in the climate. I saw at once, from the relation of those animals to one another, that there was some other reason; and I became very early satisfied that the cause of all this mischief, that the reason why the dogs are constantly fighting and tearing one another to pieces, so that you will hardly see one that has all his four legs, was the absolutely unlimited promiscuous intercourse among them. This led me at once to consider the duties of the farmer with reference to retaining what has been obtained, and improving the breeds. There are very important points that come up in that connection. I will not discuss them now, but I will just submit to your notice some of these points. The first is, the question of castration, which is so universally practised. Is it not carried to an extreme, which deprives us of a large number of valuable animals, inasmuch as it is made at such an early period that you do not know what animals you destroy? That is one point. The next is, the first connection of domestic animals with one another. I would introduce the higher principles of morals on the farm. With the view of maintaining the race, do you not restrain the sexual appetites of the young for fear of the mischief which follows? and yet, on your farms, you do not scruple to copulate animals which are too young to be productive in any way. The bulls are used at an age when they should not be allowed to copulate, and so it is with other animals. Now, the question is, at what age should copulation be allowed? Then another thing. The result of castration, as it is carried on, leaves a few males in the community to be the progenitors of the whole stock. What is the consequence? Why, you introduce the system of harems on your farms, and then every male is made to be nothing but a breeding-machine, and by that you vitiate his nature; and the consequence of that, I am told, from the few questions I have been able to put to practical raisers of stock, is already felt in many instances. I believe that it is a great misfortune that there are some few stallions which have such a reputation that no man wants a colt from any other animal but them. You would probably get better stock if this idea of the great superiority of a few individuals was not so prevalent. These are points to be considered: To what extent you can reduce your productive males without endangering the stock; and to what extent you can carry out the system of oriental polygamy on the farm without deteriorating the race.

Then there is one other point to which I would like to call your attention. That is, the effect of the first contact between the sexes. To a breeding female, the character of the first male she receives is a matter of great consequence. The whole succession of her progeny is determined by the first connection she has with a male; and a female which has been badly connected will never produce as fine a breed as one which was well mated at the first start; so that the ideas of the English aristocracy ought to prevail here in order to produce the best results.

But I have already occupied too much of your time. I wished only to point out the topics that I should like to hear discussed at full length, so that the merits of the case should be decided by you. I can only make suggestions from a physiological point of view, as to questions which have presented themselves to me, with the few experiments that I have made upon the subject. I know that in Switzerland, the number of females that are allowed to be covered by one stallion in a year, is not one-third the number that is allowed here.

Then in regard to the surroundings of females, during conception and pregnancy, and their treatment during pregnancy. I know many females miscarry, simply in consequence of the influences of their surroundings. And then the production of monstrosities. Why is it that nearly one-third of the dogs that are examined in an early embryonic condition, are monstrosities? Then, how large is the number of monstrosities among dogs? That would lead to a very important investigation, but it is more than I know.

Dr. Loring. The question with regard to the time at which males may be used, may find some answer among the Scotch farmers. It is well known that the Scotch farmers devote themselves to one of the most difficult processes of cattle husbandry, the production of milch cows. It is comparatively easy to make an animal that will take on fat easily, but to produce a female with that strong and nice structure necessary for the production of milk, is not so easy a process, and they find that not only form and shape, but great powers of endurance and a good constitution, are important and necessary. The Scotch farmer who has devoted himself to this purpose, never uses a male until he is three years old, for two reasons: one is, that he thinks the male is not sufficiently developed; and the other is, that he does not know until that time what the quality of his male is. By the adoption of this rule, the Scotch farmer has produced the most nicely organized animal in the world.

Professor Agassiz. You see, then, I become well informed on a point about which I know nothing.

On motion of Dr. Loring, it was voted that Cattle Husbandry be the subject for discussion to-morrow morning.

Adjourned.

WEDNESDAY, December 12.

FORENOON SESSION.

The Board met at 9½ o'clock, Mr. T. G. HUNTINGTON, of Hadley, in the chair.

CATTLE HUSBANDRY.

Professor AGASSIZ was called upon to open the discussion upon the topic assigned for consideration this morning, to wit, Cattle Husbandry.

Professor AGASSIZ. I have not much to say upon this subject; but from the few remarks I made last evening, you may perceive that I wish to have every point discussed bearing upon the breeding of animals in a manner that may be profitable; and it seems to me that the best way would be, not to take up the subject in all its bearings at once, but to take up one point at a time, so that we may have a specific topic to discuss. If you will permit me, I will begin by submitting the facts I know with reference to one point, and the views I entertain upon that point, and then we may collect the material which we all have upon that question.

The first thing to which I would allude is the relation of the two sexes, and the influence of one upon the other in the offspring, so that we may, if possible, get all the light we have with reference to selecting those individuals from which we want to breed, and those individuals which we are to use as fecundators. Now, there is, in the production of animals, one fact which is, at the very outset, of very great importance. It has reference, not only to the condition of the two parents, but to the condition of the ancestors. No offspring is simply the offspring of its father and mother. It is at the same time the offspring of grandfather and grandmother on both sides; and, at all events, we can trace in any offspring qualities which are not immediately to be ascribed to the father or mother, but which, in a measure, come always from one or the other of the grandparents. You see, therefore, that the security of desirable animals for breeding which is not extended to the grandparents is no security at all, because the qualities of the grandparent may crop out at any moment. What I say is not a mere matter of theory; I have experimented upon that point over and over again, and I wish that all those who take an interest in this matter would repeat these experiments, so as to satisfy themselves that here is one thing worth considering. I have experimented upon two species of animals—upon dogs and rabbits. I have myself raised at will gray rabbits from white ones; I have obtained occasionally black rabbits and white ones again almost when I pleased. With dogs I have not made so many experiments, but enough to know that this influence of the grandparents is one which is constantly returning.

Let me point out what are the facts. Suppose you have a white rabbit that is not absolutely an Albino; that is, a white rabbit which may have some color in it, or instead of red eyes may have blue eyes, or a little bit of black on the tips of the ears. You connect two such rabbits with one another, and one or other of the offspring will have the color more intensified—darker eyes, perhaps, or more color in the hair. Now, if you go on multiplying without selecting your parents, you will continue to breed, generally, white rabbits; but suppose that, in the first instance, you take a male rabbit that has more color than the other, which has black spots over the body, the offspring will contain a few individuals which will have more color than the parent, and perhaps there may be a black one. Now, if you take that black one and multiply either with his own mother or his sister, you will get more color into the offspring, and you will return these animals to their primitive gray color very rapidly. You see that here is the evidence that the character of the male acts so much upon the progeny that you change the whole appearance of the progeny if there is a marked difference between the male and the female. That is the result among animals about the ancestors of which you have no information. If you take animals which are much alike, you continue to have a breed which is of the same kind. I have never been able to make any experiments where the female was changed, because that is more difficult; but, by changing the male, you see you obtain a change in the breed.

The next point is to see how the ancestorial relation will be manifested. Suppose you have a female and male which are widely different. Take, for instance, a black rabbit with a white one. Out of them you get a great variety of tints; you may get gray ones; you may get mottled ones; you will hardly get a black one; you will hardly get a pure white one. But take any one of that breed—I have carried the experiment sometimes to the seventh, eight, and ninth generations, so that I have got so many facts in that direction that I cannot from memory single out the different cases. Suppose you take from this progeny, derived from a white and black rabbit, a white female, or one which is almost white, and copulate her with another white rabbit, as much like her as possible, you see you come to the first case I have presented, where the two parents are as near like one another as can be; but this white female being the offspring of a white and a black rabbit, her progeny with another white rabbit will contain some black ones, as unmistakably as can be. That is, there will be a grandchild resembling the grandfather. This is perhaps still more obvious and easily observed among dogs. I have had this case: a shepherd bitch covered by a bull dog. There was a variety of dogs among the young. Now, from the connection of one of them, which was as unlike either of the parents as possibly could be, with another very much like the parent dog, there have come pups that resembled the shepherd and the bull dog, in a striking manner; again, exhibiting the relation of the grandparents to the progeny of their young. Here, then, is the first guide in reference to breeding—that in order to know the character of the offspring, we should know not only what is the character of the father and mother, but also of the grandparents, as fully as possible.

Then the next thing is, the influence that the first copulation has. It is by no means a matter of indifference which is the first male connected with a female. Unquestionably, that first connection in a measure affects all the future progeny. That is to say, a female that has once been impregnated by a male, will show the effect of that first connection through life, it may be; but at all events, for so long a time that you cannot get over this first impression. It therefore shows, what I have satisfied myself to be the truth among other animals by numerous experiments: that the act of fecundation is not an act which is limited in its effect, but that it is an act which affects the whole system—the sexual system especially, and in the sexual system, the ovary, in such a manner that the production of eggs from that ovary, to be impregnated hereafter, is so modified by the first act, that later impregnations do not efface that first impression. Among turtles, I have satisfied myself, that no young is born from any turtle, until the female, during four successive years, has been fecundated eight times; and it is the eighth fecundation or eighth copulation which secures the first laying of an egg. A turtle, our little fresh-water turtle, is generally seven years old before it copulates for the first time, and it is in the eleventh year that they lay, generally, their first egg; and during that time, they have copulated twice a year, and each copulation has produced a marked change in the egg. The eggs differ so much in the ovary of the turtle, that you can trace the effect of these successive copulations, year after year. I know perfectly well, when examining a turtle, which of her eggs will be laid this year, which next year, and which the third year; it is as easy as possible. If you open the first female turtle you see in the spring, you will find that there are from five to seven large eggs, about the size of a bullet, that there are a certain number about the size of a pea, five, six or seven that are as large as a good-sized pin's head, and the rest so small that the eye can hardly distinguish them. There you have marked out the successive eggs which are going to be laid. These eggs show in their situation, the difference, and it is plain from that, that it takes these successive years, each year accompanied by fecundation, before any egg is laid. Now, there are animals which are at once fecundated, in which the egg, or a certain number of eggs, are at once brought to development and laid; but that does not shut out this additional fact, that the other eggs, which are not then ripe for development, are influenced; they are influenced in a marked degree. Here come in the particular facts which are familiar to you all, but some of which I have obtained from direct experiment. Suppose a bitch covered by a bull dog—part of the offspring will be like her, and part like the father. Suppose the next litter is derived from a greyhound; that second litter, where no bull dog had any part in the fecundation, will contain bull dogs, and always in a certain proportion; showing that the first impregnation of that bitch by the bull dog, produced an effect to be seen in the second generation, when the male parent of that second litter was an animal of a totally different character. You see, therefore, how important it must be, if these facts obtain throughout the whole animal kingdom, that the male used in the first copulation of an animal, be of a good and desirable stock, of such stock as you would like to have in the progeny of your breeding animals. I have been told that mares which have been copulated with donkeys at first, never breed afterwards good colts; that there is always something of the mule coming from the progeny of a mare that has had at first a donkey, and not a stallion.

Now, without going on to the other topics to which I would call your attention afterwards, I think we may limit ourselves at present to the subject of fecundation—to the effects of fecundation and the character of fecundation—and then pass to the consideration of the phenomena of sterility and to the effects of sterility. In our way of breeding, when we castrate so large a number of males, and when we keep so large a number of females which are never allowed to breed, what have we, in reality? What is the stock of horses with us? Castrated males and non-producing females. What is the character of our horse stock? I ask you, gentlemen, whether the vices of your horses are not in great measure to be ascribed to that fact? I do not know. It is for you to experiment upon. But it is a fact, that you raise, as the stock of horses to be used by the community, castrated males and unfertile females; and that fact is to be looked into, and it is to be considered whether that is as it should be and the best that can be.

Mr. Perkins. There are two other points that might be considered in this connection. One is, in what way shall we be most likely to fix the sex of the offspring? I will give a little of my experience and of my observation. In one case I took four ewes some twenty-five miles to a French merino buck, hoping I should get one or two lambs fit to use. The buck was old and dull, and when my ewes came in in the spring, I got four ewe lambs and no bucks. The ewes were fleshy and vigorous. Mr. Birnie, of Springfield, had a four-year old Ayrshire bull, which had become dull and stupid, and his calves were almost universally heifer calves. The bull became so stupid that he was fatted and butchered, and Mr. Birnie used a young and vigorous yearling bull. He was after heifer calves, but to his surprise he found his calves were all bull calves. The bull was a vigorous, active bull, and did not need any coaxing or delay. I mention these facts with reference to the point of fixing the sex.

Now, the question in relation to how far the male parent affects the nature and structure of the animal, and how far the female affects them, is illustrated to some extent by the connections between the jackass tribe and the horse tribe. In mating the two together to produce offspring, if we mate the horse with the genet, we have what is called the jinney; if we mate the jack with a mare, we have what is called a mule. Well, what are these distinctive traits, and are they universal. If we mate a jackass with a mare, we get an animal that has the ears and mane and tail and bray of the jackass, universally; if we mate a horse with a jill, we have a mane and tail and ears more like the horse tribe, and we have the voice of a horse, almost universally; and in the mule we have the bray of the jackass. Now, this would seem to show—and I believe it is somewhat conceded by horse-men—that the horse fixes the limb qualities of the offspring. That is, if you use a horse that is sound in all his limbs, that has a peculiar gait, the gait of the offspring is more likely to partake of the character of that of the horse than of the mare; and if the horse has any defect, such as interfering, or any limb defect, the offspring is more likely to take those defects from the horse than from the mare.

Professor CHADBOURNE. I think we have a perfect right, since Professor Agassiz is here, (and I hope he will recognize the right,) to get from him all we can; and therefore I hope he will pardon me for asking a few questions which I have had presented to me from time to time, and which I know he is abundantly able to answer, because he has made this subject a study, and I feel that we shall gain as much profit by drawing him out as we could in any other way.

One question that has come to my mind is in reference to the effect of the injury of animals upon reproduction. I would like to know if he has any information in regard to that. For instance, if a male has received any particular injury, and recovered from it—say to its limbs or its horns—what effect has that upon the offspring?

Professor AGASSIZ. I know nothing whatsoever upon that subject. I have never had an opportunity to watch a case where one or the other of the parents had any particular defect. I have no particular information upon it—only a general impression. With regard to the point on which Mr. Perkins has touched—as to what the male and female may likely give to the offspring—that is a matter which is still vague; and when Professor Chadbourne takes charge of the college, I hope he will keep a large stock of animals, and constantly experiment.

Professor Chadbourne. I have seen some things in the human species, that may bear upon the question I have suggested. I know one man, who, when a boy, had his nose broken and very badly injured. I suppose you would say, that that was such an accidental thing, that it could have no effect upon the offspring; but it is a fact, that three of his children were born with noses broken and twisted, exactly as his was. That may have been all accidental, but I state it as a fact.

Now another point, which has a special bearing upon what the Professor has been saying, in reference to the effect of grandparents. I have attended a course of clynical lectures at the college, and one day two young men were brought into the clynic, each of whom, had six toes upon his feet. Their feet were exactly alike, as far as you could see, and there was a toe growing out on the side of the foot, so that they had to wear very wide boots; and they were brought there for the purpose of having them removed. I made inquiries as to their parents, and I found that they were not brothers, but cousins; one was the son of a man whose sister was the mother of the other. The brother had a son, who had this toe growing out of the side of the foot, and the sister had a child, with a toe growing out of the side of the foot. Neither of the parents had it, but it was a characteristic of the grandparents, and appeared in the family long before. It struck me as a very remarkable fact. Here was a man without this characteristic, who had begotten a child with it; and here was a woman without it, who had produced a child with it; so that the feet of the two boys looked exactly alike.

Dr. Loring. I desire to discuss this question a little, not because I can say anything particularly new, or can throw any particular light upon the matter, which is not already in the minds of the Board; but because I am desirous of doing my duty, and saying anything that can possibly be said upon the question before the Board, to elicit any new facts of importance from others.

The subject of cattle husbandry has been introduced this morning with special reference, so far as I have been able to notice since I came into the hall, to the question of breeding. It seems to me, that situated as we are in New England, that part of the business of cattle husbandry is really of primary importance. It is important everywhere, but it is especially important in all countries where the business of farming is confined to a narrow sphere, and requires the application of the best rules of agriculture. The raising of cattle in the West, is a common-place thing; they grow there readily, spontaneously, especially on the pastures of the South-West, and Texas and Ohio. In some parts of Southern Ohio, and Southern Illinois, the raising of cattle is as easy as that of the black walnut, or any large growing tree; so that any keen observer, coming here from England, where the business of raising Shorthorns is carried on with the utmost care and without regard to rule, will find better cattle, perhaps, running out of doors in Illinois, without any special regard to male and female, than he would find in the best breeding stables in England. That is not the case here. Whatever we get in New England, we are obliged to get by hard knocks—by virtue of study, and care, and brain work, and all that; so that the foundation of the business of cattle husbandry in New England is the breeding of cattle, and the careful breeding, too. It is a remarkable fact, that the raising of cattle in New England, for the mere purpose of farm work or meat, and without any sort of reference to the dairy, as a specific object, is not a profitable business. There is not a section of New England that is so far removed from a market that it is impossible to send the choicest products immediately to a good market; so that grain can be transported from the spot where it is raised, anywhere in New England, so readily to market, that it is worth almost as much on the spot where it is raised as it is in the market where it is sold. That is not the case with grain raised at the West, of course, where corn is worth not much more than it will bring for fuel, simply because the railroads, instead of being an avenue, are almost a barrier between the grain and the market. It is doubtful, therefore, whether we can raise grain here and feed it it to cattle at a profit. We can raise it for men and feed it profitably, but whether for beef and pork, I doubt. So with hay. There is hardly a spot in New England in which hay is not profitable to sell, and so easily got to market that is is worth almost as much (not quite, it is true,) in the barn of any farmer as when brought into market. Hay in Maine and Western Massachusetts is not worth $35 or $40 a ton; but it is worth so much as to make it more profitable to sell it than feed it; so that the business of cattle husbandry is made an expensive business, not a cheap business, here; and were it not that the animal produces all that vitalizes and fertilizes the farm, no man, except for his own personal family use, would ever think of keeping a cow or an ox. That is one of the luxuries; it is a part of the æsthetics of farming; it is a thing the farmer likes; but so far as the making of money from cattle produced for the general purposes of the market is concerned, there is no profit in it. You can raise fine animals here—good cows for the dairy; and when you are breeding any cow for the dairy, it is a good plan to breed a cow for that purpose combining some other qualities that will make her useful for the shambles when her business of the dairy is over. But she must be so organized that she will produce a substance for the market from her own system that will pay for what she consumes better than the production of beef would pay. The dairy does that. But there is a higher business still for the New England farmer, and that is the production of choice animals for the improvement of the breeds of animals in other sections of the country. That is a business to which the New England farmer can apply himself with great care and great profit, and to which he has applied himself with great success. I will illustrate. There have been bred in New England, in a climate not particularly adapted to the development of Shorthorns, for instance, some of the best breeding animals of the Shorthorn variety or kind that can possibly be conceived of; animals better than you generally find in Kentucky; animals as good as the best importers—Mr. Thorne, Colonel Morris, and others—have ever imported or ever bred in their stables; and the profit of those animals in times past has been twofold. One was, when hay and grain were cheaper, the production of fine working oxen and large-sized cows in some of our rich pastures, like some of the hills of Berkshire, portions of Worcester County and the Connecticut Valley; and the other was the production of good animals to send into regions better adapted to their use. Now the New England farmer can do that to perfection. I spoke of the Shorthorn, because that is less adapted to the New England climate and soil than any other animal I know of. I do not know an animal, in the whole range of the animal economy of the farm, that is really less adapted, as a thoroughbred animal, with all his improved points, to New England pasturage, New England winters and New England soil, than the Shorthorn. I use him as an illustration on that account. The New England farmer has produced this entirely artificial animal here by care and judicious breeding, not only with benefit to himself, but also with benefit to those outside of New England.

So of our horses. I have often said that we have done more to improve the breed of horses by the introduction of New England bred horses into the horse family of the United States than any other people on the earth. The horses of New England have their peculiarities and characteristics, the result of the sharp climate in which they live, the peculiarly rich, sweet pastures over which they roam, the cold spring water which they drink, and the geological condition of the soil on which they grow, all tending, not to make a large, heavy, flabby sort of luxuriant animal growth, but a sharp, hard, clean-boned, wiry animal; and the constitutional vigor of that animal bred here in New England, I say, has done more to improve the quality of horses in America than the introduction of any foreign blood, *per se*, that I know of; so that every man who comes from Kentucky, north, or from Ohio or Pennsylvania, east, in search of a horse that will improve the breeds of horses in his own section, selects what is known practically as a New England horse, and that is what would be known specifically as a Morgan horse, bred in Vermont and improved there. I say, then, in this business of raising horses, we have been enabled, by the advantages of our climate, with care and intelligence, to produce a breeding animal of the horse kind here, which is valuable to ourselves, and almost invaluable to those who would improve the stock of horses outside of New England.

The same thing holds good with regard to sheep. It is an extraordinary fact, that here in New England we can raise what I have always said, and say still, is the *American* sheep; call it the "*improved* American sheep," if you have a mind to, and laugh at it; call it the "improved American merino," if you want to, and laugh at it; call it "a pile of grease," if you want to, and laugh at that; but there is no question that here in New England, under the influence of our climate and our soil, and with the application of the care and intelligence of the New England farmer, we can produce a sheep which combines more of the qualities of a good mutton-growing and wool-growing animal than any other sheep in the world, and nobody can gainsay it; and if you raise fifty pounds of wool upon the back of one animal, and when you come to wash it it is reduced down to seven, you can still see that that is the best and most profitable sheep for New England and for America. He has a hardy, solid frame, not maturing rapidly, so that the farmer is obliged to fatten him from infancy up; capable of enduring hardship and of being reduced in flesh at a year old and brought up again like a Devon or an Ayrshire; a prim, hardy animal, better adapted to improve sheep-husbandry than any other that I know; vastly better than any sheep bred upon the fat pastures of England or raised in the warm stalls of New England. You cannot raise them everywhere. You can do it in New England and New York. But you cannot take these sheep to Texas or Brazil and keep them up to their standard. The climate, the soil, the grass, the water, the feed, the general influences, all tend to make that animal a little softer in all his texture and fibre; his wool is set with less compactness, and when you put it into the card it does not work so well; so that at last a New England manufacturer has been honest and fair enough to say that the wool grown upon sheep in other countries does not compare for one moment with the fibre raised here in New England and the Northern and North-Western States; that is, from sheep descended directly from the "improved American merino," bred and improved here in New England. There is no doubt about that; so that all the mestizo wools, that fly about the cards like the down of a thistle, almost, are absolutely held together by what is sneeringly called "the grease of the improved American merino." This we can do here in New England, the fountain of that sheep blood which is to keep the rivers of wool flowing and in good condition in the United States. I say, this we can do here in New England. It requires care, it gets care, and it repays.

Now, all these classes of animals to which I have alluded, some of which are not adapted to New England and some of which are, it is profitable to breed here, if the New England farmers will apply themselves to the business of breeding, as the English and Scotch farmers apply themselves to breeding the best animals they can conceive of on the island of Great Britain. Breed them for the purpose of producing the best animal ; the market is always open to them, and there is no limit in this country to the demand for good Ayrshires, or good Shorthorns, or good Jerseys, scarce as they are, or good merino sheep, or good horses ; so that cattle husbandry in New England is really, when carried on in its most improved way, cattle breeding. Of course, the feeding of animals goes with it, because you cannot breed well unless you feed well. A part of the great business of the improvement of any animals is the mode of feeding from day to day, generation after generation ; but breeding is the business out of which the New England farmer can make his profits. Then, when the long, cold winter comes, he need not be disturbed for fear that the cattle he is feeding in his stalls will not pay him in the spring, because he knows perfectly well that every pound he puts upon them will be more than paid for, not by their value, pound for pound, but by their quality as breeding animals.

Now, this has brought me to the point upon which this debate was opened. There is no question that the whole business of breeding is one which requires the utmost care, the keenest and acutest observation, and a sort of instinctive knowledge of the whole *physique* and *morale* of the animal—an intimate acquaintance, a sort of secret association, which no man can get who does not devote himself to the business and sharpen his mind for the work before him. You all know that under adverse circumstances—starvation accompanied with cold and ignorance—the human race will degenerate as rapidly as any of the field products of the farm will degenerate under bad cultivation. That is evident enough. So that there are unquestionably families of men—I will not say races, but families of men—almost nations of men, who, under adverse circumstances, social, civil, national, have degenerated, until at last they have reached a point which is below that of a sharp, quick, clear, intelligent savage. The downfall of the human race from a point of civilization into degradation is one of the most astonishing facts in all human history; for it is an undoubted fact that the Hottentot in his natural condition, the American Indian in his natural condition, is better, as a type of man, than some of the fallen races of men, who have not kept themselves up to the standard of morality, intelligence and social and civil elevation. Now, the same rule that applies to man, applies to animals with yet greater force. Man has a defiant and powerful intellect which will enable him to resist outward circumstances. There is no question about it. Man is not a mere machine alone. He defies disease; he sustains and supports his life; he keeps himself in good physical condition, often, by the defiant powers of his will or his intellect alone, so that the old saying of an able man that he had no time to be sick, is perfectly and literally true. Animals have nothing of this kind to help them through their trials—nothing. They grow upon the land the servants of man, and under his hand are as plastic, almost, as clay in the hands of the potter; and let no man suppose that he can subject the sensitive and carefully bred animals upon his farm to bad treatment and bad food, and have a race which will compensate him for breeding, any more than you could blow up the schools, churches, bibles and good government among any people, and expect them to maintain themselves in their position as part of the human family. It is impossible. All the animals upon the farm, governed as they are entirely by their instincts, guided as they continually are by the superior ability of man, wholly subservient to him, dependent entirely upon him for all they eat and all they drink, and for their daily comfort and condition—these animals require all the kindness and care and regularity of feeding that can possibly be bestowed upon them; and when they receive that, if they have been bred in accordance with those rules which should guide an intelligent farmer in breeding, they will always carry the marks of that kind treatment upon them, from the expression of their countenances to the graceful hanging of their tails. From one end to the other, that elegant, fair, graceful, good bearing, which an animal has that is taken care of by a kind-hearted and intelligent man, tells the whole story of the way in which man can elevate the whole animal kingdom up to his uses and to his wants. I say, therefore, let no man expect that he can play the brute among his animals, and at the same time raise either himself or his animals up to the standard of good agriculture. It cannot be done.

This, sir, is the *morale* of breeding, and lies at the foundation of the whole thing. Once having made up your minds that you are equal to being lords of the animal kingdom, once having established the fact in your own superior consciousness that you are competent to do that business, then you can apply yourselves to the selection of animals for the purposes of breeding, and apply yourselves to the business of procreating those animals, and increasing them upon your farms. How is that to be done? I have no doubt I shall repeat what I have said before; I have no doubt I shall be obliged to repeat what has been said this morning; but if I am taking up the time that others desire to occupy, I will stop in a moment. This matter of selecting animals is the first point. I insist upon it, that no animal should be selected as a breeding animal, which has either sustained an injury himself, or whose ancestors have sustained such grave injury that he bears upon himself the slightest mark of it; because it is perfectly apparent that the inheritance of acquired faculties is almost as certain as the inheritance of natural faculties. I do not mean to say that this is a positive rule, but I say that it comes so near being a positive rule that every close observer of animals, every close observer of man, knows that it is as near a rule as you can get. I have not a multitude of facts to sustain the idea that a simple injury would damage a breeding animal, but I do know that certain mutilations will be transmitted, sometimes not to the damage of the offspring. How is it that the best family of Ayrshire cattle which I myself have ever undertaken to breed, descended from a bull acknowledged to be in many respects, and almost in all respects, the best Ayrshire bull ever brought into this country—how is it, that that whole family of animals carry the mark of their parentage upon the ends of their ears? The ear of an animal of the bovine species, is generally as evenly rounded as the top of an arch; but here is a whole family of animals, the ends of whose ears are either square or scolloped, or clipped, precisely as you see them scolloped or clipped, when they are sent from the farm into the hill pastures of Scotland or England. Where did they get this? It certainly is not natural. That peculiar characteristic of the ears of these animals must have been caused, not by one clipping, perhaps, but by generations of clipping. How far that establishes the rule, I will not undertake to say ; but it does fix it so much in my mind, that, as a practical breeder, I should avoid breeding from an animal that had any defect caused by an injury. I agree that it is a matter of nice science to tell whether the rule is a fixed one, or not. I do not mean to say that it is ; but as a practical breeder, I should avoid such marks. For instance, if there is anything in the world that I detest and abominate, it is what is called a drooping rump, in any thing, unless it is a French trotting horse. A kanuck horse, that can trot his mile in 2.40, and then has ended his business, may possibly carry a sloping rump—if he wants to do it. It is not an evidence of good breeding, decency, or anything else, and that is the only animal I will forgive it in ; and I would not forgive it in him, but for the speed he can get up now and then. But if there is anything that is admirable to the eye of a man who is fond of cattle, it is a straight, true, level rump. I don't know why it is : whether it is because he knows that the nice pieces lie there somewhere, or because it is a graceful thing to see ; but so it is. You do not see it in pictures. You do not see well-bred animals in pictures ; they are not in accordance with nature. It is the art of man that has made the animal good-looking. Now, there is nothing to which our cows are more liable, when covered by heavy bulls, than to get broken down. The tail is not very strong, and is easily crushed down upon the pelvis. I have no question, then, that a breeder might produce, from a straight-rumped family of animals on his farm, a set of animals whose rumps were sloping and broken down, if he allowed his cows to be broken down in that way by heavy bulls. I do not mean to assert, as a fact, that it would be so, but I would avoid it, just exactly as I would avoid the selection of ears of corn from my corn-field, that came from defective hills, or had defects themselves. So, too, I would be particularly careful about animals that had injuries upon them. With regard to natural defects, every man knows that they must be avoided. It is hardly worth while to discuss that matter. A crooked foreleg in a bull will be very likely to make its appearance in his offspring, and everybody knows that if there is anything that will annoy a farmer, it is crooked-legged, knocked-kneed cattle. If I had a knock-kneed bull, I should expect to have a family of knock-kneed animals. So of feeble hocks. If I had a stallion, whose foot was out of order, I should expect the feet of his colt would be a little disposed to get out of order. If I had an animal with such defective lungs that he was short-winded, I should expect his progeny to be short-winded. If I had an animal with a delicate stomach, I should expect his progeny to have delicate stomachs;—just exactly as, in the human family, we know that we sometimes get from our ancestors, diseases and defects. It is hardly worth while to discuss that point. So, while I would avoid animals that have defects from injury, I would also avoid those that have natural defects; and when I came to the selection of animals to breed, avoid all accidental and all natural defects. What then? Here is a bull with a straight rump, high head, even shoulders, deep through his heart, his offal properly balanced, and his quarters very large—is he a good breeder? There comes the question. And that is where the man is obliged to get underneath the hide of the animal, inside of his brains, and find out, as Professor Agassiz has just whispered to me so significantly, his *temperament.* Why, animals have their moral sense, and their intellectual sense, and their sentiments, just as much as we have, and there is just as much difference between the calm, sagacious, well-behaved, prudent stallion or bull, and one that is constantly quarrelling, fighting, tormenting and destroying the temper of the mothers of the flock,—a mere pest of the herd,—as much difference as there is between the man who sets a good example to mankind, and one who sets a bad example to mankind. So that a breeder, in selecting a male animal for the purposes of breeding horses, or cattle, or what not, must be able to understand, by a sort of intuition, what the temperament of his animal is—especially the male, because it is through the male that the great improvement comes. Always, the females are the subservient; it is they who do the work, and the male secures the increase, in reality, and produces his stamp.

Now, after having, as I say, selected the animal of the form which you like, the next thing is to select the animal of the temperament that you like. The temperament which one breed of animals should have, is exactly the temperament that another breed, or another kind, or another species, should have. For instance: It is just as necessary that an ox should be sagacious

—it is just as necessary that a cow should be quiet, and strong, and calm, and prudent, and well-behaved—as it is that a horse should be. Every man, whether he keeps one cow or fifty cows, knows that what he wants, particularly for a good dairy cow, is a placid temper. There never was such a thing as an irritable, and at the same time a valuable, dairy cow. The two things do not go together. So then you must, in breeding animals of the bovine species, select that calm temperament; for when you come down to the matter in hand, having secured the shape that I spoke of, it is the animal that is well organized in this way that is a good worker, docile, easily trained, and patient. It is the animal of the kind of which I have spoken that performs her part well in the dairy; it is the animal of the kind of which I have spoken that breeds well and transmits good qualities to his descendants. And when you pass from the horned cattle on your farm, and go to your horses, every man knows that there are just as distinctive qualities in families of horses as in families of men. You can go into any part of New England, and you will find that there have been certain stallions which have produced good driving, patient horses, with no vices about them. They do not kick; they do not bite; they are not opposed to work; they are ready to go about their business at any time; and every horse-purchaser goes right to that spot to see if he can get an animal of that family. On the other hand, you find families of horses entirely different; and in all the animals that we undertake to breed upon our farms, we find the defects of which I have spoken. Now you can create a bad temperament, if you like. There is no question about that at all. A team of oxen will always tell the story of the driver. You need not look at the driver. He may be in a grog-shop, for aught I care, taking his eleven o'clock, or hid under his wagon eating his economical bread and cheese; look at his team, and the team will tell the story of the driver almost always. See that stately, high-headed, patient-looking team—*confident*-looking—(that is the word; how it expresses the appearance of a good ox-team!)—four or six, attached to a heavy load. They stand waiting, *confident-looking*, knowing that there is nothing between them and their destination except the length of the way. Now, it is the man who, having selected his team, imparts to them that confidence. He never despairs, and they never despair; he never frets, and they never fret; he never gets irritated, and they never get irritated; he marches on, and they march on. Just exactly as it was said in old times: "I would rather have an army of stags with a lion for a leader, than an army of lions with a stag for a leader." Take the best team of cattle you can conceive of, shaped all right, measuring right, weighing right, and in proper condition, out of the hands of such a teamster as I have spoken of, and put them into the hands of a man of the opposite characteristics, and you will find that your team will partake of the character of the man. And it is exactly so with breeding animals. A patient, good-tempered, intelligent, well-behaved stallion is put into a stable, and is approached with a club, and muzzled, and sworn at, and frightened; and, when brought out to cover a mare, if he fails to make a noise, and break down the fence, and tear up the earth, he is put down as a dull, stupid fellow, not fit for the purpose of breeding, and is irritated, pounded and lashed into this excited state simply that he may be a *gallant* stallion! The old song says: "There was General Washington, upon a *strapping* stallion;" and it seems to me that is about the best expression I ever heard to describe what some men seem to value most in a horse. A breeder who undertakes, as they say, to keep a "stud horse," must have a "*strapping* stallion;" and he keeps his "strapping stallion" up to this mark; and for a time he will cover up all the defects of the animal—his miserable shoulder, his round fore leg, his feeble stifles, inefficient back, and shocking tail, by the exhibition of the power that he has to convert him, before all mares and all observers, into a "strapping stallion." What sort of condition and temper is that horse in for the purposes of breeding? What state of mind is he in to go about his business? What sort of temper do you expect he is going to transmit to his posterity? Why, if he were let alone he might do a decent thing; if he were allowed to preserve his equilibrium he might possibly be tolerable; but in the state of irritation he is in, he not only transmits his weak organization to his posterity, but he also transmits the acquired honors of his disposition—that intellectual condition which has been impressed upon him by the man who does not know how to take care of him. In this whole matter of temperament, it is the man who rules and controls the animals. He can transmit to the creatures he produces on his farm his own placid soul if he likes.

I think that the most admirable sight in the world, next to that of a general leading his army to battle, is that of one breeder whom I can select in New England, who has raised a breed of animals from a low stage to a high one. His flocks know him as their protector and benefactor ; and when he goes in among them with his long white wand, all he has to do is to indicate by that wand to a particular sheep that she is wanted, and she obeys. There is no confusion ; there is no trouble. It is like a school under the control of a humane teacher, who does not whip his boys nor his girls either, and testifies to the influence which the character of a man has over all that comes beneath his rule. If you want to see a sight which will impress you, and teach you what you may be yourselves, as controllers of the animal kingdom, go with me into the sheep-pens of Edward Hammond, of Vermont, and there you will see what I have described. I have never seen anything finer, more beautiful, more admirable, more significant, of the power of the human race over the animal kingdom than what I have seen there. Now, I say that we, as intelligent farmers—not prairie farmers, not farmers chasing our cattle over the pampas armed with spears and the lasso, but men who have subdued the animal kingdom, and have at last brought the mind and will of the animals (or propose to do so) under our own control—as men engaged in this business, I say, we are bound, if we expect to be good breeders of cattle, to preserve our equanimity among our flocks and herds ; and if we do, they will manifest the same temper in all their dealings with us.

Professor Agassiz alluded to the effect of the first impregnation upon female animals. I was glad to hear him speak of that, and I hope that, as long as he is a member of the Board, or in any capacity a teacher of the farmers of New England, he will continue to reiterate it. It is the prime and fundamental rule of breeding, that the seed which you are to plant, for the purpose of bringing forth certain fruit, should be planted upon a virgin soil ; not upon a soil that has previously been contaminated by foul seed of any description. Every man who has observed his flocks and herds, well knows that the influence, whether it is a physical or a moral influence, of a low-bred male used for the impregnation of a female of good blood, and kept for certain breeding purposes, is always disastrous, and cannot be otherwise. Therefore, if you expect to do anything to improve the character of New England stock, as members of Agricultural Societies, never offer another premium, for a bull that is not of some pure blood of a certain breed. All this talk about "native cattle" is the merest prejudice; it does not amount to anything. The native cattle, are no cattle at all. They are just like the dogs the Professor spoke of last night, as running in the streets of Brazil—irritable, half-bred, half-fed, all sorts of shapes, no uniformity, no fitness for any one of the objects of the farmer. If you are going to pay premiums for male animals of that description, you might just as well pay premiums for the poorest crop of corn, wheat, or hay. I should as soon think of offering a premium to the man who would reduce wheat down to its natural condition, prior to its being wheat (if there ever was such a condition,) or corn down to its condition before it was corn, as of offering a premium for a male animal of what is called the native breed. There is no sort of propriety in such a thing. I would therefore insist upon it, that every premium offered for male animals should be offered for good animals of some specific breed.

Mr. Smith says, "I forget Mr. Anderson's stock." I do not forget it. I want to ask if he got his fine stock with runt bulls or grade bulls? I want to know if he started out from the hills of Shelburne and went down into the Connecticut Valley and purchased an animal whose pedigree he did not know well? And has he not boasted that since he has begun to breed he has always kept in his stalls a bull of unquestioned pedigree, which had been bred so long and so well that all good judges of cattle in that neighborhood knew what kind of animals he would produce? Why, the great secret of Mr. Anderson's success is, that he has rejected the grade bulls, and has continued to breed up to a standard by the use of a pure breed of bulls. I am now talking about male animals kept for breeding, and about the way to improve your cattle and secure good animals of a pure and distinct breed; and you may all land exactly where the Messrs. Anderson have landed, with good herds of cattle, of certain descriptions, bred up to the standard, by the use of a good, pure breed of bulls. I trust, therefore, that in the selection of animals, and in the offering of premiums by societies, special regard will be had to animals of certain specific breeds, that have their pedigrees well authenticated.

It is unnecessary, I think, for me to allude to the matter of feeding. I hope that the discussion upon the question of breeding will be continued, and that the farmers present will give their experience in these matters. So far as the business of feeding is concerned, it naturally belongs to the business of farming, just exactly as much as the manuring of land belongs to the raising of a crop. Every farmer knows perfectly well that it is good hay, good pasturage, good roots and good grain, that make the animal; and the most judicious and economical modes of introducing that nutrition into the stomachs of your various animals have been so often discussed, and are so well understood by most farmers, that I have no desire to enter upon it here.

Professor AGASSIZ. There is one point in the selection of breeding animals which has not been touched upon, which I believe is of great consequence, and that is *color*. The color of an animal is always associated with certain definite qualities; and I should assume, from what I know of the lower classes of mammalia, that the rule would obtain also among the higher ones, or among those which are of higher value on the farm. For instance, animals that are entirely white have uniformly weak eyes—bad sight; at least, that is the case among rabbits. All those that are purely white have such weak eyes that they are almost blind. I suppose that is an indication that we must avoid a light color. It is a kind of bleaching of those darker tints which are connected with the qualities of the blood, and I think, therefore, indicates a certain feebleness of the system, which it is not desirable to propagate. I should like to know the experience of farmers in regard to white cattle, white bulls, and the like, and whether they have similar peculiarities of constitution to those that I have noticed among rabbits.

Then, again, a very dark color—perfect black, for instance—indicates a predisposition towards another kind of indisposition, which is well known among those interested in the study of disease as amaurosis; and that kind of indisposition is certainly also noticeable among black rabbits. How is it with thoroughly black horses which have very dark eyes? I do not know enough of that description of cattle to have a definite opinion, but I have no doubt that it is a point to be taken into consideration. I am satisfied that the best animal for breeding will be found to be that which approaches most nearly to the primitive, natural color of the animal. Now what is the natural color of a horse? I do not know. The wild horses, in their primitive condition, are not known with certainty; but we have a great many species of that genus which are known as wild. We know several kinds of wild donkeys, the wild horse of Africa, the zebra, &c. They are either gray, or, sometimes, a brownish gray, or they are fox color mixed with gray. These are the natural tints, and therefore I would say that the grayish-brown horses are those which approach the primitive color of the species most nearly, and that would probably be the best color for animals to be used for breeding purposes. But that is merely theoretical. I should like to learn from the practical farmers here present what has been their experience with reference to this point, and also to the point I have previously touched upon—the influence of the male upon the progeny.

Mr. Stedman. I can speak with reference to the last question which the gentleman asks—the influence of color upon cattle. I have been a breeder of Shorthorns. Some of the best of these cattle are entirely white, and I have never discovered any weakness about their eyes. I think if there is any difference, it is in their favor, as kindly feeders. But it is a color we do not desire. It is not fashionable, and we avoid it as much as possible. It is said by those who are the best authority, that no Shorthorn exists without some white. I thought, when that fact was first mentioned to me, that I knew exceptions; but on examining those which I supposed to be purely red, I found about them some parts more or less white.

With regard to the influence of the first impregnation, I have no doubt that it has an important bearing upon the progeny. I have known some of the best bred animals that were thus contaminated. They showed it distinctly in their future offspring. And here I will state one fact which the Professor has not mentioned. The effect does not always crop out sensibly; we do not always see it. A Shorthorn cow, which has thus been contaminated, may, after being delivered of that impregnation, produce several apparently well-bred Shorthorn calves; but eventually, she will have one in which the evidence of that first impregnation will unquestionably crop out, in the long branching horns. I have one case in mind of a magnificent Shorthorn heifer, that was thus accidentally impregnated, and after bringing several calves that showed no evidence of contamination, brought one and then another, in which the effect of that first impregnation was clearly shown.

I think we are in danger of receiving a wrong impression from one remark which Dr. Loring made, with regard to the cattle of the West—that an English breeder would find there, cattle superior to those at home. The doctor did not say but what they were indigenous to that country ; but I suppose the fact to be that they were carried there. It is the blooded English cattle that have been carried there at different times from the year 1817, to the present time, that have produced the style of cattle found there, and which we are endeavoring to produce among our herds here.

Dr. Loring. Mr. Stedman will remember that when I made that remark, I was speaking particularly of Shorthorns. I made those remarks under the "Shorthorn" head of my discourse. It was with particular reference to the Shorthorn, and I stated that he was not exactly the animal best adapted to New England, but was particularly adapted to the West. I remember very well, that shortly after Judge Douglas came home from England, (and he was a very close observer of everything that came under his eye,) he said to me : "I saw a great many herds of Shorthorn cattle in England. I was interested in looking about among the farms, and I can find a much better general average of Shorthorns in Illinois than I can in England." And then he remarked that it was evident that the pastures and climate of Illinois and Ohio were particularly adapted to this breed of animals. It was with reference particularly to Shorthorns that I spoke ; and I am perfectly cognizant of the fact that it is the introduction of Shorthorn blood into the Western country that has made the raising of beef there not only practicable but highly profitable. Shorthorn blood has done that thing.

Mr. Smith. I alluded to Mr. Anderson's stock while Dr. Loring was speaking, not because I did not think he respected that stock, but because of his remark that he thought we ought not to offer premiums for grade bulls and grade stock. We have offered premiums for grade bulls and grade stock, with special reference to Mr. Anderson's stock; because, if we did not, he would be debarred from competing for our premiums.

I cannot answer Professor Agassiz's question with regard to color, but I can ask another, which is always easier than to answer. I would inquire if the color of cattle affects the beef or the dressing of the beef. I am acquainted with a gentleman who has been in the beef business for sixty years, and he is very much prejudiced against white cattle. He prefers red or black, or any color to white. He says they never dress well; and I notice, that in Mr. Robinson's report in the "Tribune," of the prices of beef, he makes this remark frequently—"country red commands a larger price than any other beef." If, then, the color of cattle is going to affect the price of the beef, it may be our business to consider it.

Professor Agassiz. I have no knowledge of the influence of color upon meat, but I am satisfied that the change of color must be the result of some general change in the system; and if it is not shown in the eyes, it will be shown in something else. We ought, therefore, to endeavor to ascertain what part of the system is simultaneously affected with any change in the color, which we perceive distinctly, and that is not yet recorded. Of course, what I know of these things, is what is recorded in books. I have not found on record any indications of the qualities, of any kind, which are connected with the white color in cattle; but with some animals, it is well known that there is a general weakness, and especially a weakness of the eyes, associated with a white color. It may be, as Mr. Smith has suggested, that there is something in the meat of white cattle, which renders it less palatable, than the meat of colored cattle.

Mr. Smith. I know, from my own observation, that red cattle dress the best, and sell for a greater price by the hundred, than pure white.

Professor Agassiz. What was the reason offered by the dresser, for preferring colored cattle? That would guide us more than the fact; because sometimes such things are the effect of mere prejudice, and we should not allow ourselves to be misled. A thing is not established because it is a prevailing prejudice in some places. Can you tell us the reason?

Mr. SMITH. All beef dressers know very well, and can tell before they dress an animal, how it will dress; and they know, I believe, that a white, and perhaps a brown animal, will not dress as well as an animal of another color. I am not a butcher, and I cannot tell the reason; but I have heard the gentleman to whom I have alluded, speak of it frequently. He says, "that animal will dress livery."

Dr. LORING. I have no desire to occupy all the time, but this question of color has opened up a new chapter, and a pretty interesting one, too. The white color of animals, is the most artificial one that we have. I think no man will deny that the white color belongs to those races of animals that have been most subjected to the skill of man, in the way of breeding. Now there is no such artificial animal in the world as a Shorthorn. I have always considered the Shorthorn of England the most remarkable tribute to man's ingenuity and skill in moulding the animal kingdom that I have ever heard of. Suddenly, some keen observer of cattle discovered that a certain bull was producing a type of animal that would make beef faster than any animal he had ever seen, and he laid the foundation of a whole breed of animals that do make beef faster than any other breed—are ripe when they are born, and keep ripe until they are fully grown. I think this artificial breeding develops, to an extraordinary degree, white cattle. There is another class of animals bred for the purpose of making meat as rapidly as possible, and that is the Cotswold sheep. Now, then, what is the quality of the meat of the Cotswold sheep and the Shorthorn? Mr. Smith says that the butchers prefer red animals because their meat is better, and that they say the meat of animals which he described had a "livery" look. Now, that word "livery" brings you right back to the old English expression in regard to cattle. The cattle of Holland, from which, unquestionably, the Shorthorns were produced, in early days were brought into the market and sold at a low price, because they were what was called "lyery." Their meat was dark colored; it was not well marbled; the lean part of the meat was in one mass and the fat part in another mass. It was not the favorite meat of any people in England except those who were obliged, for economy's sake, to get the most fat they could for the least money. And so it is to-day, sir. You go to England, and you will see that an English nobleman breeds Shorthorns to make beef of, and make it rapidly; but he does not eat it—he knows better than that. He breeds Cotswold sheep, that are precisely analogous to Shorthorn cattle, but he does not eat them—he knows better than that. When he wants a piece of meat that is suited to his palate he will go to the Highlands, or to the Devonshire region, and select an animal that ripens less rapidly than his Shorthorn, and whose meat is more mature, better marbled, and the juices of which are more matured, for the purpose of making the best kind of beef. I remember that one day, in conversation with Senator Sumner about farming, (and he finds out pretty much everything there is going on,) he delivered a lecture to me upon cattle. Among other things, he said that some years ago he was in Scotland, and stopped with a friend of his not far from Edinburgh. In walking about his estates, he saw running on the hills a little solid, well-shaped black Highland ox—what the nobleman called a "Highlander"—what we call a "West Highlander." Two or three days after there was upon the gentleman's table a fine, sweet, juicy piece of beef, with a certain mountain flavor to it. The senator at once remarked, "This is a remarkable piece of beef." "Yes," said the nobleman, "that is the little black fellow you saw running on the hills the other day." That is the beef the epicures eat and have upon their tables, because it is of a higher quality than the beef of the Shorthorn—matures slowly, ripens well, and comes as near the condition of the natural, wild mountain meat as anything can come.

Having touched a little upon the question of meat, I will go to the question of color. All the animals that range alongside of that Highland black ox that so fascinated the palate of the senator and his friend—all the cattle that come alongside of that for the purposes of the table—are of a sort of red color, more or less. The Devons are the next in order. Everybody knows the quality of a piece of Devon beef. There is no question about it at all. There is nothing better in the world. It comes nearer to that native beef I have just described than anything else, because it does not ripen quickly. The breeder of Devons does not take his animals to market until they are four or five years old. He does not sell his calves, because they are not ready to fatten at once; he keeps them and sells his two or three year olds. The meat matures more slowly, and is stronger when it is ripe. I agree with everything that Mr. Smith has said in regard to color, and it is confirmed by the facts I have stated.

Now, there are certain other curious facts with regard to the component parts of animals. Last summer I had occasion to go several times to the Hoosac Tunnel, as a member of the legislative committee on that enterprise. I stopped one day at Shelburne Falls, and endeavored to find out what it was that had made that village. They told me it was cutlery. I went into one of the manufactories, and through the politeness of the superintendent I was enabled to examine the shin-bones of cattle used in the making of knife-handles. I found there were two kinds of shin-bones; and I asked the gentleman who was kind enough to show me the works what the difference was. "Why," said he, "one is the New York bone and the other is the Boston bone. The New York bone is the best; it is the heaviest. The price is the same in the market, but the cattle from Ohio and Illinois that are brought to New York have larger, heavier shin-bones than the compact and snug Northern cattle that come mostly into the Boston market." So that, so far as the production of a certain kind of bone is concerned, that comes into one category, and the production of meat into another. Large bones and the best quality of meat do not go together.

I found another curious fact in this county. I was at a town on the Merrimack River not long ago, in the night time trying to edify the people, and in the daytime endeavoring to get edification from them; and I found that the chief business of the place was the manufacture of horn combs. I found that there was a difference in the horns of animals as well as in the bones; that the horns coming from Kentucky and New York were poor, and not well adapted to the purposes of comb-making. The horns belonging to those animals that I have just described as possessing the best qualities as meat-producing animals—the well-organized Northern cattle, which are unquestionably Devons and grade-Devons—these are the horns for comb-making; whereas the Kentucky, Ohio and New York horns are vastly inferior. I come to the conclusion, then, that to get an animal for the best-flavored beef, you must have a small bone and a poor bone for the purpose of making handles, and he must have good horns for the purpose of making combs.

I state these facts as curious, and because they are the result of my own observation, and bear upon this matter of color and general structure.

Harrison Garfield, of Lee. There is one question that presents itself to my mind in relation to the subject under discussion, and that is, the best method to be pursued in feeding—for instance, calves that are to be raised. My idea of breeding an animal is that it must be kept in a thrifty condition until it is near maturity; so near, that no stinting of food will in any way cramp its development. Allusion has been made to the large development of the cattle of Ohio and Kentucky. I happened to be in Kentucky and Ohio some years ago, and examined several farms. Their mode of raising their calves is to let them run with their cows until the cows shake them off. After they are dropped, the farmer takes no further pains, except to feed his cows well. They have abundance of good clover feed, and never pretend to milk their cows when their calves are with them; and the consequence is, the calves soon attain to a large size when they begin to get some of the sweet feed with their milk. This mode makes calves of large development, and carries out to perfection all it was intended the animal should be. It is a question in my mind whether we do not make a mistake in taking our calves from the cows when they are, perhaps, only two or three weeks old and feeding them; whether we do not stint them in their development and cramp the perfect symmetry of their shape by doing it. Our lambs run with our sheep until they can get their food for themselves or the sheep dry up, I believe. I never heard of a man taking his lambs away from his sheep to wean them; I do not know but they do sometimes. Colts run with their mothers until they are of sufficient age to get their food for themselves, and their stomachs are sufficiently strong to digest the food. So far as the mother can impart anything to her offspring it is done. They are allowed to remain with them until they would receive, probably, no more from their mothers in perfecting their shape and form. It is a part of the system of breeding with us to take the calves from the cows at an early age and subject them to feeding processes. The question is, whether that is not a mistake. I hope the farmers here will give us their views in relation to this thing. My idea is, that if we are to make the most perfect animal, it must run with the mother until she has imparted to it all she can.

Professor CHADBOURNE. I am satisfied that the matter of color is one of deep significance, and I hope it will not pass out of the minds of the members of this Board; but that they will make accurate observations in regard to its effect. There are many curious things in connection with the color of animals, that I am entirely at a loss to understand, and I was very much delighted when the Professor referred to it this morning. It has seemed to me strange that we overlooked it, when it is so evident that it has such a connection with the characteristics of animals. When we take wild animals, we see how generally color is associated with sex. Take our birds. The male scarlet taniger is perfectly brilliant, while the female is not; I doubt if one man in a hundred knows the female bird to be a scarlet taniger. The male knows it, and naturalists know it, by the peculiar characteristics of its structure. Its color is a dull yellow, entirely different from that of the male. We find this difference running through our birds—a certain color for the female and another and distinct color for the male; and Darwin,—(Professor Agassiz told us how much we are indebted to him for his development theories, and we are; he has presented a wonderful number of facts, which will be used to meet him)—Darwin says that the turtle's color usually comes from the female, and that cats with blue eyes are always deaf. He cannot account for it, but says it is so. So when we find a particular color, we shall be able by and by to discover that it is connected with some other characteristic of the animal; and I have been very much interested in reading the report of Professor Agassiz's lectures, in reference to the change of color of parrots by peculiar feeding. It struck me as a very remarkable thing; and something has occurred this fall which is entirely new to me, and the moment I read the Professor's lectures I began to study this fact. It is this. The squirrels have been abundant, as everybody has noticed; but everybody has not noticed that there have been a great number of red squirrels with perfectly white tails—just as white as milk. One was caught and brought to me. I supposed it was a mere exception, but I found that they were very numerous all up through Vermont. The children of Dr.

Farnsworth, of New York, were up there, and out in the woods, and they saw there red squirrels with white tails; they caught one, put him in a warm room, and fed him, and the tail began to turn; and it was not more than ten days before it was just exactly the color of the rest of the squirrel. Now, the question is, whether the food of the squirrel did not have upon him something the same effect that it has upon parrots in South America.

[After a few moments' interlocution, in which several members of the Board and others participated, Professor Chadbourne continued:—]

There are certain other facts connected with this change of color. It is well known by those who have studied the birds of this country, that the ptarmigan, or grouse of Greenland, becomes perfectly white in winter; in summer, it changes its color. But in the summer time, those birds that live and build their nests up near the glaciers, so that they may be said to be in a sort of semi-winter state, never completely change, but retain during the whole summer part of their white feathers. And, more than that: while the common color of their eggs is about that of our partridge eggs, part of the eggs of those birds that build their nests near the glaciers are perfectly white. I got some of those eggs, and they were just as white as hen's eggs. The missionaries say they are always of that color. I do not undertake to explain these facts; I only mention them as facts. Then, again, as you go north among the Faroe Islands, in Iceland, you find that they do not shear their sheep; they catch them and pull the wool off, and you find a strong tendency in the black sheep to have white wool mixed up in their fleece. I saw it first to a marked degree in the Faroe Islands, and then in Iceland, that seemed to be a characteristic of the flocks there.

Mr. Flint. It is well known to all who are familiar with the diseases of animals that white horses, or perhaps white and gray horses, are subject to some diseases to which other colored horses are not. Take, for instance, the disease known as melanosis. I don't suppose a case of that disease was ever known, or if ever, but very rarely, in a black, bay or red horse; but it is not uncommon in white horses. It is a disease which appears in the form of tumors; and you frequently observe a large tumor near the root of the tail of a white horse. If, as is often the case, it appears in the form of several tumors, there may be a number of tumors upon the tail, under the jaw, and probably in the internal cavities. That fact struck me as rather a curious one, as seeming to show some inherent weakness which may be indicated by the color.

Professor AGASSIZ. I may say a few words upon the origin of these changes of color in some animals, which will show that such changes cannot take place without a very important modification of the general functions of circulation and secretion. It is best exemplified in the cat. The cat, in its natural condition, is gray; but if you examine the hair of a single individual, you will find that that gray color is not produced by a uniform gray tint spreading over the whole fur, but by every hair being alternately ringed with black, white and russet color. Each hair has these colors in rings alternating with each other, the black rings being more numerous near the root of the hair; so that when you open the hair and look at the base it will appear as if it was thoroughly black, and if you look at the tip it will appear almost perfectly russet, because the reddish hair is more numerous near the tip. There is about an even mixture towards the middle of the hair. That is the case, to a very singular extent, upon the surface of the body of a gray cat, or of the cat in its normal condition. Now, what are tri-colored cats? They are cats that have patches of white and black and russet hair upon their bodies. A white cat is one from which the coloring matter has been taken away from her hair and is now deposited in her eyes and paws and in the margin of the lips. So it is with the black cat, in which the white passes into the eyes, the paws, the intervals between the jaws, and so on. There must therefore be modifications of the secretions of coloring matter among cats, so that in one case it shall be divided in a regular ratio on each single hair, and in another case divided among particular parts of the body. It is impossible that such changes should go on without considerable effect upon the condition of the skin, and in consequence of that, upon the general condition of the animal; but what that effect is, I do not know. I cannot believe that animals of the same species can exhibit widely different varieties of color without exhibiting at the same time concomitant differences in other respects; and in order that this subject may be studied, I have called the attention of the Board to this matter of color.

With regard to bones and their relative hardness, I might say a few words. We have in Switzerland two kinds of cattle, widely different; small, hard-boned cattle, and large and rather loose-boned cattle; and they grow in different parts of the country. The heavy but loose-boned cattle grow in the limestone regions, in the Alps of Freibourg, and on the Jura. The small cattle, which have compact bones, grow in the granitic regions. You see at once why. The cattle find no limestone to lick, and therefore do not have sufficient limestone in their organization to make a large skeleton. The consequence is, the formation of small and compact skeletons in the granitic regions, while in the mountain regions, the water all contains limestone, and the animal gets with his food limestone, the tongue brings in a larger supply, and so it has limestone enough to dispose of, and that is disposed of rapidly in the formation of bone, which makes a loose structure and a large frame; and so we have that difference strikingly marked throughout the different regions of Switzerland.

JONAS HOLT, of Andover. It is said that man cannot violate the laws of nature with impunity. I would like to ask if it would not be better to let all young cattle feed upon the mother? I have no doubt that is the true secret of raising cattle. If the calf or colt is allowed to go with its parent until it becomes nearly mature, I have no doubt it will have a great influence upon the stock; but whether it will pay here, where milk and butter command a high price, is another question. Some say it is just as well to take the calf right from the cow, but I do not think so. You may raise a good cow, and perhaps a good horse, by artificial feeding, but the natural food of the calf or the colt is the best. But when you come to the question of dollars and cents, perhaps it may be better to raise by artificial means. I recollect I had a litter of pigs, some years ago, and my wife said: "What are you going to do with those pigs? I have not got any milk for them." I said: "We shall not have any trouble. Just give the old sow enough to eat, and there is no doubt she will have milk enough." And I had as good a litter of pigs as I ever raised, without giving them any milk. They got sufficient milk from the mother until they got large enough to digest ordinary food.

It has been said that butchers do not find white cattle so good as cattle of other colors. I have known something about butchering, and I have often heard it remarked by butchers that a white ox would not weigh as much as a dark-colored ox, in proportion to their size, and that the handling of the beef indicated a quality better than it really was; that white cattle would indicate a very good kind of beef, but when you came to dress it, it would not weigh. I do not know any reason for it, unless it is because it is not as compact as the beef of dark-colored cattle. If any one can give the reason I should like to know it.

Mr. PERKINS. The question has come into my mind, whether, if a man was blindfold, and feeling of a white ox and a black one, he would be likely to be deceived. Anything white looks larger than a dark-colored thing. I know that butchers frequently say they don't like to buy white cattle and lump them, because they get deceived in the weight. A white ox may give us an idea that he will weigh more than he really does, because his color makes him look larger.

I doubt whether white cattle and horses are as tough as others. We have had occasionally wall-eyed cattle with a mixture of Durham blood. They were nervous and irritable, and I supposed it was because they could not tell exactly the object that was near them. These animals may look to be of good strong constitution, but I have noticed that, generally, they will not wear well. A wall-eyed ox will not work with one that is not wall-eyed; they have not such strong constitutions. Now, in relation to horses, you will find that most of our horses that are white when ten years old, were gray when three, four, five or six years old. The skin of these animals is a dark mouse color. I do not know that they are any more tender than darker colored horses, but I know that any horse that has one or two legs white and the rest dark is inclined to scratches, and white-legged horses are always more inclined to scratches than any other. Where a colt is foaled white, his skin is white; but where it is foaled dark, and turns white as it grows older, the skin always has that dark color.

Something has been said in relation to breeding dairy cows; whether a cow that does not come in before it is six years old is likely to be as good a dairy cow as one that comes in at five; whether the milking qualities of one coming in at five are likely to develop themselves as fully as those of one coming in at four; whether the dairy qualities of a cow allowed to come in at four will be as fully developed as if she were allowed to come in at three; whether, if a cow comes in at three, her dairy qualities will be likely to be so fully developed as at two. Mr. Matthew Smith, a former member of this Board, always used to let his heifers come in at two years old. He said he was satisfied they made better dairy cows than they did when not allowed to come in until a later period.

There is one other idea that I should like to have the opinion of the Board upon: whether if there is no impregnation from the first copulation, that copulation has any effect upon the future progeny.

Professor AGASSIZ. I have made no experiments upon that, and a very interesting investigation is suggested by your question, and it may be experimented upon in a very easy way. Take one of these young virgin animals that has copulated without being impregnated, keep her for some time, and then give her another male, and that fact will be ascertained.

There is one point of this subject which has not been discussed, and I would bring it to the attention of the Board. That is, the age of copulation among animals, and the influence which that has upon the sex of the offspring. There are a good many statistics concerning that derived from the human species. Gütleg the Director of the Astronomical Observatory in Brussels, has published a book entitled, "Statistics of Man," in which he has collected all the facts he could obtain concerning the number of male and female births in different parts of Europe, in all cases where the age of the parents was known; and he has derived from these observations, which were very numerous, the conclusion, that a young male with a more advanced female, produces male offspring; that young females with older males produce female offspring—on the average, not absolutely; and that with individuals of the same age, whether younger or older, the probability is that the offspring will be about equally divided. That is all the information I can submit concerning the influence of age upon the sex. Whether there are other influences which determine the sex is another question, which has been often discussed and is now under experimentation in Europe, and with reference to which I do not know exactly how the facts stand. But it seems to me, from some experiments made at Geneva and at Neufchatel, on several farms, that the condition of the female while in heat, and the time when the male is brought to her while under that influence, has an effect upon the progeny; that is, that the female receiving the male in the first of the heat will bring a male rather than a female; and in the latter part, a female rather than a male. Whether that will stand as the fact or not, I do not know; I only know that experiments are now making upon that point on several farms in Europe. But what is unquestionable is, that the age of the parents, the relative age of the one to the other, has an influence upon that, and upon the fertility of the female, and the age of the males at the time they are first allowed to serve, has an influence also. The practice in some parts is to use the males very early. That will not help multiply the proofs, because we do not know what are the limitations in those cases, and cannot combine our proofs in such a manner as to derive decided and definite conclusions from them. But the whole question of age, I would now suggest, is one for discussion, and one of considerable importance.

Mr. THOMPSON. There is one point that I have found from experience to be of some importance in the breeding of cattle which I have not heard touched upon to-day, and I would like to have some gentleman give his experience upon that point. It is this: the period of heat at which the female will most surely conceive. Whether or not it is best to wait until the period of heat is nearly over in the female before copulation in order to insure conception. As long ago as when I was a boy, we were always ordered to drive the cows off the moment there was any indication of their being warm. If it was at night, at milking time, we must drive the cow off then—not wait until morning; it would be too late. Since I have been an owner of stock,—which has not been more than half a dozen years, my experience has changed my opinion on that point. In some cases I have waited eight and forty hours before I drove a cow to the male, or else the copulation would not result in conception. It is so with swine and with the bovine and equine races, so far as my experience has gone, within the last few years in particular. I should like to know if the experience of other gentlemen has been similar to my own.

Mr. Perkins. I wish to inquire of Mr. Thompson in relation to the number of the litter in the case of swine.

Mr. Thompson. I never have thought anything about that; but I know that one young boar that I carried over from Northampton last year was coupled with a sow, very large and old, when she first came in heat, and there was no impregnation; she did not conceive. The next time we waited eight and forty hours before copulation, and she had sixteen pigs.

Mr. Slade. It has always been a very desirable point with us to produce male pigs. In our part of the country a great many pigs are raised to sell to the Irish, and they have quite an aversion to buying a sow pig. It was stated, some two or three years ago, I don't now remember where, that in order to produce a preponderance of male offspring, the mother should remain in heat some time before she was covered by the male. Three years ago last spring I had a very likely sow that was in heat, and I let her remain thirty-six hours before taking her to the boar. The result was, she had seventeen pigs. Eleven of them were males and the others females. Four of the latter died, leaving eleven male and two female pigs. At the next litter she remained about the same length of time in heat before taking the boar, and had nine male and two female pigs, all of which lived. I was making this statement to a friend of mine, and he said he had always observed the same thing from boyhood. He was always told by his father that if he wanted to raise bull calves, he should keep the bull from the cow as long as possible.

Mr. Dodge. I will state that I have had a little experience in one direction in regard to cows. For a period of twelve years I kept, on an average, fifteen cows, and invariably kept a bull to run with them. I never had a farrow cow. If I wanted one to fatten I had to buy it. I don't know that there was any difference between the number of bull calves and heifer calves; but I am inclined to think, on looking back, that there were more bull calves than heifer calves. I never observed such a marked difference as has been stated here.

Dr. Loring. I think the question Mr. Thompson has asked is a very difficult one to answer. I don't think we have facts enough to indicate at what time in the course of the heat we should put the male to the female, or what condition of the male and female will produce certain sexes. It seems to me to be very difficult to get at the statistics showing it, and we must run for luck in that matter, so far as I know, until the thing is well established. But if you can keep a cow in heat forty-eight hours before you take her to the bull, I should go for letting her wait; but that is not easily done. Mares run in heat longer; and while we have no facts to show that the time of impregnation in the heat will decide the sex of the offspring, we have certain facts that go to show that mares at the latter part of their nine or ten days of heat, are a little more apt to conceive than at an earlier period. But that is all in the dark; we have not satistics enough to show us what rules we can lay down. It is all beyond our reach. It is something more than physiology—we hardly know what; something that we cannot explore so readily.

But the question Professor Agassiz asked, as to the age at which males should be put to females, is a question that can be answered. There is no doubt that the use of young males in breeding in New England, has been injurious to our stock. I mean, so far as the size and condition of the animal are concerned. You must remember that the bull has always been an outcast. A bull about a farm is generally considered a nuisance. He does not make any milk, he does not make any beef, he does not do any work; he is a sort of scullion on a place. He is a *bull*, and that is enough to damn him; and the quicker he serves his cows and gets out of the world, the better everybody is pleased. That has been the feeling with regard to breeding animals, among the great majority of New England farmers. We do not want to keep them long. We will take them at a year old, if they are big enough to get at a female, even with a little assistance, and set them at work; and if they will breed at that age, let them breed and get rid of them; but to winter them is the horror of farmers. It is not surprising, therefore, that our market is full of starvelings and runts; and it is unquestionably true, that one cause of the deterioration of New England cattle is owing to the fact that the males have been used at too early an age. Mind you, gentlemen, I have dwelt upon the *art* of this business half a dozen times this morning. Where a man gets it into his own hands, he is bound to make it governable by his own rules. Now I say, where this art has been applied to the purposes of producing beef, and the animal has been fed liberally for that purpose, a young male has managed to do his work decently, and, possibly, with fair and moderate usage, to keep himself along in good condition. That can be done ; but the best Shorthorn breeders in England will test what the stock may be, and then wait until the animal becomes more mature before they use him to any considerable extent. But there is a class of breeding where all the functions of the animal are to be developed for a prior purpose ; where, in order to secure the object in view, the constitution of the female must be entirely developed, and that is in the production of dairy cattle in Scotland. There the farmer pursues an entirely different course. The Scotch farmer endeavors to raise a hardy animal for the purposes of the dairy, and knowing that the wear and tear upon his cow when she goes to work is to be as great as that upon himself when he goes to work, and if she does give from fifteen to twenty quarts of milk a day, during her milking season, she is making a draft upon her system which nothing but the best constitution can endure, he never uses his bull until he is three years old. He desires to know that his animal has reached very nearly the point of maturity in his general constitutional condition. He desires to know, moreover, what kind of animal he has got, and he cannot satisfy himself on these points until his animal has reached that age. So that the farmer who is breeding, not for the rapid production of beef, which is so entirely an artificial business, but is breeding to secure animals with good constitutions for specific purposes, allows his male animal (just as Professor Agassiz has suggested,) to reach that condition of maturity which will enable him to transmit a good strong constitution to his offspring. In this part of the business of breeding, I have no question that our cattle have been injured by the use of young males.

Now, in regard to the use of young stallions, I insist upon it that no young horse is fit to breed until he has reached maturity. I have tried it myself, over and over again. I have undertaken to observe that business, and the only horses that I have known that bred constantly and thoroughly well were horses six or seven years old ; and I have seen the most disastrous results upon a horse—who is a most sensitive animal—by reason of too early copulation. I have seen a horse thrown entirely into the shade by the inferiority of his early get. Used at two years old for purposes of breeding, he got one class of colts, and when seven or eight years old an entirely different class. So that I distinctly declare here, and I want it distinctly understood by all horse-breeders, that no horse should be used for the purpose of breeding until seven or eight years old, and then kept upon his muscle by work and proper feed.

So much for horses. One word in answer to Mr. Garfield's question. Mr. Holt has undertaken to answer it, but I do not think he has. There is no universal rule. A Shorthorn breeder must give his calves all the milk that his cows will give—and that is not saying over and above much; because it is well known that Shorthorn breeders in England don't pretend half the time that the cows will bring up their own offspring. But when you come to the other branch of the business, that is another thing. Here, again, I go right back to the Scotch farmer. You cannot make a dairy cow by keeping your calf until it is three or four months old upon its dam. You will make the bone of that calf's leg as big below the knee as it is above the knee; you will develop his head out of proportion; you will make the bony structure so large, that when you want to develop that part of her structure connected with the lacteal system, you cannot do it. The whole animal economy is diverted from the object you have in view. You do not want to raise a big-boned animal, or to develop that secretory system which produces fat. You want to engage in a thing based upon wholly different processes of nutrition, and that is, the power of that animal to produce milk. Now what does the Scotch farmer do in that case? He takes his calves from his cows as soon as they are dropped, hardly allowing them to draw from the mother the milk with which the bag is full at the time of calving, which is generally considered so useful at that time. He begins at once, and keeps that animal within such bounds in regard to growth as to make a good cow of her. He feeds her with oatmeal gruel and a little milk, slightly warmed—the best food in the world to bring a young animal into fine, growing condition. So that, if you desire to produce a good heifer, you have got to follow the example which the Scotch farmer sets you; and, my word for it, if the breed is good, the blood good, and the ancestry good, you will get pretty near what you want. You must feed for the purpose—one way for one object and another way for another. Take the pig. The pig is meant to eat. It is the business of the pig to eat; you are not making milk there. Fatten a Shorthorn—you may make beef—not a dairy cow. And so it is with horses. Never expect to have a good horse if you cram your colt; it cannot be done. The old adage in Vermont, "A ragged colt makes the best horse," means everything. It is not the tendency in a horse to make fat, but the tendency established in his life, when he is young, to make muscle and nerve that is the desirable thing. Your colt, then, should run with its dam until it has reached that condition of the stomach which will enable it to digest solid food. Then take your colt and let it have abundance of free cold air to begin with; and in addition to that, avoid the feeding of grain until it is three years old, as you would avoid feeding brandy and water to your children when they are little. It is astonishing how many nice colts are ruined by the excessive use of stimulating grain food in their infancy, so to speak. Let your colt mature slowly, its bone grow properly, its digestive functions be properly organized, its flesh in the proper condition—never fat—horse fat is the poorest fat in the world—keep it upon the best English hay in winter and good sweet pasture grass in summer, and you will make the best possible horse of that colt.

I state these facts in regard to feeding because they have come under my own observation, and they answer the questions which have been put to us.

Mr. STEDMAN. I think that for us to adopt the practice of allowing calves to run with the dam would be injurious to the milking qualities of our cows. I think the milking qualities of Shorthorns have been injured by the continued practice of breeding for the production of beef rather than milk. If we were to allow our Shorthorn calves to run with the dam, they could not take all the milk which the dam is ready to give, and the tendency would be to dry up the cow to a certain extent, and she would go dry early. This would be injurious to our interests. I do not believe we can afford it. But it seems to me that we may adopt the practice, to some extent, in our breeding of animals, of letting them obtain milk in the natural way in some form. I think the practice of our Shorthorn breeders in New England is, if they want to bring a calf forward with considerable rapidity, not to let him run with his dam, but to take a cow of an inferior quality, a farrow cow, or, if it is a milch cow, a grade cow, and put two calves upon her. For bringing up male animals I think that is the better way. I think we should let them have a cow, but not their own dam. I know Shorthorn cows that bring up two calves in that way admirably. But I do not believe that it would be best for us to bring up too many of them in that way. Yet it requires a great deal of care to bring them up artificially. I think the way in which they are very commonly brought up, by feeding them with bulky food, distends the bowels, and produces an ill-shaped animal, which consumes more food than it would if brought up in a proper way, with less distension of the offal, and a better development of the valuable parts.

Mr. GARFIELD. I spoke of the practice of the farmers of Southern Ohio and Kentucky. There they raise cattle for beef, not for milk, castrate their male calves and let them run with their mothers. The mothers, large Durhams, adapt themselves to respond to the wants of the calves, and do not give much milk. The farmers pay no attention to milking their cows. They have some cows that they milk, which, to appearance, give double the milk that those cows do which have their young run with them; showing that by cultivation and training they can be made to give more milk than they do when they simply raise their offspring. Now the question I raised was, whether, in raising our bull calves, Ayrshire, Shorthorn or Jersey, we did not make a mistake by taking them off from our cows? I do not think myself that the practice could be followed here in New England of raising all our calves in that way; I think we could not afford it. But when we want to raise a bull for a special purpose, would it not be better to do it in the way nature has pointed out? That was the thought I wanted to present, and upon which I wanted to get an expression of the farmers present.

Professor AGASSIZ. I would like to allude to one point which has some interest in this connection, and especially as bearing upon the period of conception. We must know, in order to appreciate the influence of the time of copulation upon fecundation, in what way the animal egg is brought into contact with the sperm. It is well known, from the observations of Baer, that every female animal carries eggs, as well as birds, and that those eggs have to be fecundated in order to produce offspring; and of late, Bischoff has made experiments to ascertain when the eggs descend from the ovary, and are brought into the lower part of the female sexual organs, where they can be fecundated. Now, conception is nothing but the contact between these eggs, which descend from the ovary, with the sperm of the male at the time of copulation; and you have got to make that contact in such part of the female organ, that the egg can remain there, attached to the wall of the uterus, form its placenta, and grow; and unless all these conditions are combined, you can never have a female conceive. When does that separation of the egg from the ovary take place? When does the egg begin to be laid? That is the question. I would go back a little to the birds, where we know something. All the eggs that are laid by a hen have been fecundated, if fecundated at all, before the shell was formed, otherwise no fecundation would take place. In what part of the organs of the hen were the eggs, when that fecundation was successful, which made the egg come down to receive its white, its albumen, and its shell, to be laid as a fertile egg? It is in the ovary that fecundation takes place. For that purpose, the sperm has to travel all the way up the channel to the ovary. How is this done? It is not by the length of the male organ, for the birds have none; and you see it would be a mere misapprehension of the mode in which fecundation takes place, to suppose that the depth to which the sperm penetrates could be measured by the length of the male organ. It is not so. The sperm is ejected into the female organ, it may be at the very edge of it, and is carried up by the nature of the internal surface of the female organ, as high as the ovary, where it fecundates the egg of the bird before it is detached. In the turtle, the egg remains in the ovary, after it is first fecundated, four years, before it is detached, brought down, and laid. In the bird, the consequence of the fecundation and of the transmission of the sperm to the ovary is, that the egg is detached and falls into the fallopian tube, and is brought down through into the cloaca, where it shortly receives its shell, and is then laid. You can see, then, that in birds, which lay their eggs one after the other, and in animals, which lay many in rapid succession, successive fecundation must intervene, because of the precise position in which the egg is fecundated, and the different places in the organs in which they grow to their final condition. Now, in the case of the mammalia, we know so much by the experiments of Bischoff, and I know thus far from actual observation in rabbits and dogs. No experiments on that point have been made upon the cow or upon the mare, so that everything you would like to know with reference to fixing the time when you must copulate, in order to obtain fecundation is to be learned, there is nothing upon record. But about dogs and rabbits, and particularly dogs, this much is ascertained, that what we call heat is the beginning of the natural efforts of the system to throw off eggs from the ovary, before they are fecundated, and to set them going in the channel of the sexual organs, downward to the place where they can be fecundated. Now, Bischoff has ascertained that it takes so many hours in a dog for that egg to come down to the point where the sperm will reach it, and fecundate it. He has ascertained, also, that that fecundation does not take place always at the same spot, but that it may take place before the egg has got so far down as the spot where it remains in the womb, to be there attached, form its placenta, and grow. It will perhaps be worth while, in the course of time, to slaughter a number of cows, just at the time they begin to be in heat, to trace the position of the egg while in the downward course, in order to ascertain when it would be best to bring the cow to the bull, in order to obtain fecundation. All these matters bear so directly upon the question of the production of male and female, that they may be of vital importance in certain districts. But how this question is to be settled, I do not know, because, as I tell you, we have no book observations respecting the descent of those eggs. The experiments are very difficult. The egg of any mammal is so very small that it is hardly visible to the naked eye. When my eyes were in their best working condition, I could just barely see the rabbit eggs; but generally, to make sure that I did not mistake a speck of decomposed fat, or some coagulation of blood, for an egg, I had to resort to a magnifier. But even with a magnifier that does not increase more than ten times the diameter, you can see an egg so distinctly that you distinguish its internal organization, and know it is an egg; so that you can locate the place where it is at a given time. It is in that manner that Bischoff made his experiments. He copulated two animals, for instance, and the instant copulation was over, killed the female to ascertain how far the egg had proceeded at the time of the copulation. He has killed in that way a number of animals, at the very beginning of the heat, and he found that there were no eggs dropped from the ovary, and that it is only after a certain number of hours during the heat that the ovary begins to drop the eggs, and that it takes a certain time for those eggs to advance into the viaduct. There is, then, this point to be determined, when fecundation takes place. This opens such a wide field of research, that I do not know in how many centuries we shall know all we wish to know of it.

There are animals that have a bifurcated uterus, in which there are two ovaries, into which the eggs drop from the right and left viaduct at the same time and in succession. There may be two, three, four or five on one side, and two, three, four or five on the other. In turtles I have ascertained that generally there are about as many on one side as on the other; but I have had cases in turtles in which I have found five eggs on one side and one on the other, that had grown to maturity, and would have been laid as ripe eggs, four from one ovary and one from the other; often five from one and one from the other. But generally it was two or three on one side and as many on the other, according to the practice of the species. The snapping turtle lays as many as thirty or forty eggs, and will have twenty on one side and five and twenty on the other; and I have seen those that had half a dozen on one side and the great majority on the other—but never the full size that those animals can produce. The little black turtle lays only two or three eggs, one on one side and one on the other—perhaps a second on one side—but generally one on each side; while the yellow-bellied turtle generally lays five, six or seven eggs, three or four on one side and as many on the other. It has taken about ten years to learn that from turtles alone. You cannot expect, then, to find out these facts by asking the question. It will take the work of teachers in the Agricultural College for generations before we get all we want to know.

Professor CHADBOURNE. I understood the Professor to say that the eggs of birds are fecundated in the ovary?

Professor AGASSIZ. Yes, sir, I do mean to say that, so far as my experiments with hens will determine it.

Adjourned to 2 o'clock, P. M.

AFTERNOON SESSION.

The Board met at 2 o'clock.

Mr. STEDMAN moved that a committee of three be appointed to report at the next annual meeting some system by which the Board may collect and embody, in the form of statistics, information relative to the propagation of the various domestic animals.

Mr. S., in advocating the passage of the resolution, said: It has been observed, Mr. Chairman, by the discussion this morning, that we proceed about as far as we have done in years past, and do not get much further. Many of us recollect certain facts in our business operations; many, equally important, we forget; and none of them have been recorded with sufficient accuracy to be wholly reliable. My idea is, that by the appointment of this committee, and by issuing a printed schedule of questions, (such as, for instance, the age of your male? the age of your female? the length of time she goes with young? and various other questions which such a committee would suggest,) which each member of the Board who is engaged in breeding may take and distribute among agricultural people, we might be able to gather a great amount of information, which, if left in this loose way, would never be put into shape, or, if it was, it would be of such a character as to be of no value; some would record one fact and some another. It occurred to me that something of this kind might be done to promote the object we have in view.

The motion was adopted, and the committee subsequently appointed, as follows: Mr. Stedman and Professors Agassiz and Chadbourne.

GRAPE CULTURE.

This subject having been assigned for consideration, Hon. E. W. BULL, of Concord, addressed the Board. He said:—

I do not propose, gentlemen, to repeat again the invitation which on former occasions I have made to the Board, to examine into this matter of grape culture, and look at the arguments by which it is proved that grapes can be profitably cultivated in the vineyard. That is all over, for it is a demonstrated fact to-day, and more than one hundred acres of grapes are now growing in Massachusetts. A year since, when we made some investigations in order to ascertain how many we had in our county of Middlesex, where the Concord originated, we were surprised to find that fifty-four acres were planted in fourteen towns nearest to Concord, without being able to ascertain how many, if any, were planted in other towns. This year, within my knowledge, not less than forty acres, and probably more, have been planted, and this does not include the small holdings. I assume, therefore, at once, that the possibilty of growing the grape in the open air is demonstrated—that the vineyard is to-day established in Massachusetts. I want to say to you to-day what, in my judgment, is the truest way to success with the vineyard, and to state to you those circumstances tending to successful grape culture which are indispensable. For instance, you must have a soil which is suited to the grape—that is to say, a warm, dry soil. You must have a grape which is itself perfectly hardy without protection; for you cannot, without great labor and expense, take down and protect the vines in a whole vineyard. Let me tell you, in passing, what I mean by that term "hardy." It is very common to speak of grapes as hardy, which, upon trial, prove to be tender in the winter, and hardy only with protection. Those grapes which are hardy with protection—which can be made to live with care and skill in the open air—are not hardy grapes; but only those which, when well-ripened and well-grown, will, like other plants, survive the severest vicissitudes without protection—as we say the apple is hardy, the pear is hardy, and the oak is hardy. In that sense, and that only, would I say a grape is hardy—that it survives the most severe vicissitudes of our winter season. We have always grown, in this country, to a limited extent, by the aid of skill and protection, especially in our cities, grapes of foreign origin; and we have always had our perfectly hardy native grape—that which the Northmen found, in the eleventh century, so abundantly that they christened this coast "Vine-land." I desire your attention for a moment to some of the qualities of that grape, and the circumstances attending it, as they seem to me to be true, that you may perhaps proceed with me in raising from it seedling grapes, in the confident expectation that in the future, from this hardy native stock, you will be able to get grapes of excellent quality for the table and for wine, and as hardy and enduring as the present native grape. Only in that way, it seems to me, shall we be able to establish the vineyard successfully; only in that way shall we be able to get grapes good enough for all our purposes, and which will add another staple to the granite and ice, which are said to be the only staples of Massachusetts. I confidently believe that we shall have the grape added to our products. I believe that in a former period of the world's history—perhaps before the ice period—it was, like the indigenous grape of the East, of a greatly superior quality to the grape of the present day. Perhaps it was obliterated during the ice period, but the seeds remained in the debris. Or, possibly, from the South it crept North by slow degrees, many of the plants dying, but many adapting themselves to the climate, though suffering, in consequence, of the shorter seasons than the grape is known to require in other parts of the world. I suppose this may be true, because our grape is distinct from that of the East: and if the indigenous grape of the East was always good, as we have reason to believe—for the vineyard grapes of to-day have been grown from that—then I conclude that this was originally a much better grape, but suffered under these disastrous circumstances, losing its good quality, acquiring a thick pulp, a placenta-like substance surrounding the seeds, which protects them from the severity of the season, and helps them to ripen if they fall prematurely. The pulp is disagreeable to us to eat, yet that pulpiness, that thickness of the skin, and that coarseness of habit are all incident to the processes of nature, which hardened them to new conditions, and enabled them to survive the severe climate to which they were exposed.

Now, if that be true, we, by successive reproductions from seed, are simply restoring the grape to its pristine excellence; we are not debilitating, we are not altering much; but simply restoring it to its original condition. But however that may be, this fact is established—that by a constant reproduction from seeds, you can ameliorate the quality of the grape; and since it is reasonable to suppose that a process like that once begun will not find its limit immediately, we expect to achieve still further successes, and to ameliorate the grape to that condition where it shall be equal to the foreign grape in its qualities, and adapted to our climate in its conditions of vigor and hardihood.

In passing, let me bear testimony to the work of those eminent men who in this ancient town have done so much for horticulture. To the elder Manning, who introduced the pear at great expense, and with a European correspondence sometimes almost diplomatic ; who, in advance of others, brought to this country those choice specimens of the pear which have since been disseminated, and for which his modesty prevented him from receiving the credit. To your Mr. Rogers, the grape-grower, and Mr. Allen, two gentlemen who, I believe, are the only men in this country who have had absolute success in hybridizing or cross-breeding the foreign grape upon our native stock. Your Mr. Rogers, in particular, has done a great work. I am delighted to find that a gentleman of his skill and persistency has taken that method of reproduction, because, having taken another mode myself, we shall be likely, by one mode or the other, to secure the result we aim at. Hybridizing with the tender foreign parent is attended, I suspect, with this danger—of making the plants more tender, and affecting our native stock too much for our climate ; but possibly, very possibly, Mr. Rogers may succeed in getting a hybrid which will be quite hardy, and the quality of which shall be so good as to suit the most fastidious. I know that by my method of reproduction we must wait a long time for the choicest grape ; but I believe that by my method I may ultimately achieve success, and I think myself it is the surest method—slow but sure. The wild grape, in the second generation, gave me the Concord ; the grandchildren of the Concord have given me, this year, grapes of so much better quali y than any before raised, that I regard the problem as settled, that we shall have grapes as good as we desire, that shall be perfectly hardy in open-air culture.

Now, having this primary fact of vigor and hardihood in the grape you are going to plant, all the conditions of culture in the vineyard must be present or you will not have success. You want a suitable soil, you want a proper aspect, you want to prepare that soil properly, to plant and train the crop within certain reasonable and proper conditions, or even then you will not have success. There is such a thing as a little wise neglect in grape-growing; and I am sensible more and more, with every succeeding year, that we have interfered too much with the grape to obtain the best success. We prune too much, we manure too much, we trench the ground too deeply; and finally, by this perpetual interference—by summer pruning and artistic training into set forms which we insist upon—we have actually deprived ourselves of a portion of the crop at least. In the first place, it will be immediately apparent to every horticulturist present that a crop that requires heat must have its roots within reach of the influence of the summer sun. Now, in our Massachusetts, and throughout the North, the soil does not get heated sufficiently for the roots of the grape during the summer to a greater depth than to about twelve inches. If you trench below that and manure, as is usual, the subsoil, the manure will invite the roots of the grape down into that colder subsoil. They are sure to go there, and they pump up crude and immature juices, which do not feed the grape so properly as those do which are nearer the surface, and which are ripened and elaborated by the action of the heat of the sun. I think I may say that I know that to be true. Let me relate an incident in my practice which led me to consider that subject—for I used to trench. When I began, I followed the books, and I had a qualified success. I had a success so much greater than my neighbors that they came to me to know how I grew grapes in my garden in Boston. I followed the books and the methods practised by horticulturists, and might have done so up to this day, had it not been for a certain incident which happened, which led me to plant nearer the surface. We had been planting, and Saturday, at night, we had one vine left over, which we laid in by the heels by the side of the garden walk to be planted on Monday morning. We forgot it, and it began to grow. Of course we left it there, and in the course of the summer that recumbent stem pushed out roots into the hot surface-sand of the path. They did not go there for moisture, for it was not there; nor for manure, for it lay over the edge of the sandy path; and I could see no other reason for their going into that surface-soil, except the heat. That vine remains there to this day; it was never planted. On the garden side, which was a tulip bed originally, I followed a root going out from this vine twenty-five feet into that soil, four inches from the surface only.

That vine is ten years old, and last year it gave me one hundred and twenty pounds of fruit, and this year it gave me seventy-eight pounds. It makes abundant wood. It has not had, from that time to this, any manure of any kind. I have purposely neglected to feed it with anything, even bone-dust, or ashes, or pabulum of any kind, that I might ascertain how long it would thrive without it. It has apparently come to that point now when it needs feeding, for it gave about forty pounds less crop this year than it gave last year, and I shall refresh it with bone-dust and ashes, both of which I consider indispensable to the grape. I mention this fact to show the necessity of heat at the root of the vine—bottom heat—and how much wiser as well as easier it is to plant near the surface than to plant deeply in trenched ground.

In regard to aspect, it is certain that a warm and sheltered aspect is of great advantage to the grape. It is often equal to a degree or two further south. A south slope, with shelter of wood or belts of trees on the north-east and west to prevent the winds from blowing away the hot air created by the heat of the sun, is always the most desirable. Get and save all the heat you can. If I were asked what element is more needful than all others to the grape, I should say *heat*. Heat is indispensable if you want to achieve the highest possible success in grape-growing. Heat at the root and heat in the surrounding air; planting near the surface secures the first, and sheltered aspect the last.

No fruit grown is so patient of drought as the grape. There are certainly some few kinds that need forcing with rich manures and irrigating in a dry season, but they are the exceptions and not the rule.

Although the grape does prefer this light, warm, sandy loam, in our climate, to heavier lands, it is not by any means certain that it would not do even better in a soil more or less calcareous, for it is found in Europe, and I suppose it to be a general rule everywhere, that a calcareous soil is best suited to the grape—that the fruit and the wine will be of better quality than where the vine is grown in sandy soils. If one therefore had a soil of that description, (and some such soils do exist in Massachusetts,) which yet was a little heavy with clay, it might be ameliorated by culture so as to carry the grape well. I know an instance where, on a heavy soil of a calcareous character, the Concord grew with great vigor, bearing large bunches; but the grapes were not so good to eat as those grown on a warm soil, and the grower, a distinguished horticulturist of this State, told me he could do nothing with them. That same gentleman has found a method of growing and ripening the Concord, so that he took the premium for the best specimens of that grape shown at the last exhibition. You can, therefore, modify these adverse circumstances by cultivation and skill, and by the application of those particular substances which are so necessary to the grape in order to secure a crop. I speak specially of phosphate of lime, ashes and sulphur, to some extent. If you manure excessively, mildew is apt to ensue. I have heard horticulturists say they did not care for mildew because they could kill it with sulphur. But sulphur is powerless to prevent the recurrence of mildew, and unless you want to be put to the trouble of applying sulphur every year, you will adopt the other method and save your manure. I would advise you to manure at the time of planting. To promote the formation of young roots manure is indispensable. I should apply it as for the corn crop, at the rate of about forty loads—ten cords—of good compost to the acre, and plough in three or four inches deep. After that I would never give any manure from the barn at all. Compost would be better than manure, because less gross; and being composted with vegetable matter, it would add to the soil—if such a soil as I have recommended—that which the soil needs while it is suitable to the grape. The grape is the daintiest feeder of all growing plants. It abhors even vile odors, according to an old writer; and certain it is, that grapes grown on a pure, sweet, dainty soil are of better quality than those which grow upon coarse and heavily manured soil. I know that, absolutely. I have a little vineyard on the top of a hill, which is a gravelly loam, charged with some protoxyde of iron, which, during the whole time it has been in my possession, for twenty-nine years, has never had manure but once, and that was given to the crop which preceded the planting of the grapes. I did not, at the time of planting, believe that it was a good spot for a vineyard; but a German grape-grower, a gentleman of experience and culture, being at my place, recommended to me the planting of some Concords four feet apart. The Concord being a rampant grower, I had planted, before that, eight feet apart;

he thought they would succeed better four feet apart. I took the German method and planted that spot with vines four feet apart, because I supposed that, being on a barren hill, they would not grow so rampant; that we could hold them in place easily. Let me say, that at one of our exhibitions, where I carried some large handsome bunches to give to the guests, and some smaller bunches from this hill-top, one of the guests, a grape-grower of Middlesex, and a gentleman of long experience, came to me and asked: "What is the grape in the other room?" I said, "The Concord." "I don't mean the Concord," said he, "but the smaller grape." "The Concord." "You needn't tell me that it is the Concord; it is a great deal better; it is one of your improved seedlings," he said at once. When I told him the circumstances, he said: "Then I don't know anything about grape-growing." I instance that to show that manure is not necessary; that the grape is so delicate a grower that it does better where the soil is not manured; if oxyde of iron is present I should think it an advantage. That vineyard gave me bunches half the size of the largest bunches from other vineyards, but the quality was a great deal better, and the fruit makes a great deal better quality of wine, corroborating the opinion of French wine-growers, that you must not manure a vineyard. It is a well-ascertained fact, that some vineyards in France which have to be manured once in ten years, because of the circumstances of the case, do not give the succeeding year their usual quality of wine; and that wine is either saved for distillation, or brought to market without the name of the vineyard attached to it, if it be one having a reputation.

But although you can succeed so easily with a hardy and vigorous grape, under ordinarily favorable circumstances of soil, there are some which you cannot succeed with in that way. Whatever habit the vine has of itself, whatever habit was born into it, remains with it; it is inflexible, obstinate and intractable in its habit. You must treat the vine, therefore, according to the necessities of the case; what I have said would be the proper treatment for the Concord grape, or any other vigorous growing grape, would be the worst method possible for the Delaware, a slow-growing grape, a grape which requires high feeding, and which you cannot succeed with unless you give it high feeding. Some of the tender grapes that are grown here, those grapes suited to the amateur, those grapes that are indispensable, one or two of them, to every grape-grower, will require protection and skilful treatment, such as is given to the foreign grape when its culture is undertaken in this country, to succeed. But of that I do not propose to speak any further now.

I do not want to say anything about special grapes, because, as a rival grape-grower, I should be suspected of prejudice immediately; but I feel obliged to say this: that you must take with some amount of salt all the startling announcements of new grapes, which are going to be better than anything ever seen before—more hardy, more profitable, and going to bring you a dollar a pound in the market. You will have to buy these grapes, of course,—I do,—everybody must,—because out of them all there may be some prizes worth having; but I would go into that moderately; I would not believe too absolutely the statements made by persons who have originated or obtained them, and put them upon the market. Great mischief comes of it, in this way. An enthusiastic man purchases a few hundred vines, plants them, and is so much disappointed in the result, that he gives up grape-growing altogether—which is a great harm.

Now, to persuade the public to plant vineyards, it will be necessary, not only to show, as I have just shown, that it is practicable, but how you may make money out of it; for if it is not profitable, our people are not likely to go into it. The gentlemen of the Board will remember what was said yesterday, in the debate in regard to the Agricultural College—that the students of that institution, after having acquired their education, would have such a distaste for the labors of the farm, which they would come to look upon as abasing them, that they would go into other and more profitable pursuits, and leave the farm altogether. If that were true (which I do not believe,) the vineyard is the alternative which would keep them at home, provided it could be shown to be profitable. Now, that the culture of the vine is profitable, has been established in the experience of every grape-grower who has grown it on any extensive scale for several years. It is prolific, it is constant, it is marketable—more so than almost all other fruits; and therefore, if you can get good crops, it is very profitable. For seventeen successive years, I have not failed to have a grape crop; sometimes larger than at others, but always a renumerating crop; and a ready market is always found for it. As to the market: the first season the Concord went on the market, it was sold at ten cents a pound; the next at twelve and one-half cents; the third year, at a shilling; the fourth, at twenty cents. The earliest shipments to market this year brought thirty cents, and the average price was twenty. But suppose your market to be glutted—the alternative is wine-making. The wine-maker will buy your grapes, and the price of grapes for wine-making is ten cents a pound. At Hammondsport, two hundred miles west of Albany, where they have a large vineyard, and make large quantities of wine—having, indeed, an incorporated company—the common price is ten cents a pound for wine-making. Let us take this estimate. The Catawba yields, on Kelley's Island, three and a half tons to the acre. They boast of it as a large crop, and so it is, for that grape. Colonel Husmann, of Missouri, fifty miles west of St. Louis, gets nearly nine tons to the acre. Mr. Jode, of Burlington, Iowa, took 8,860 pounds from half an acre—being the first crop, four years after planting. These crops are constant, I suppose, because Mr. Husmann says, in his book upon grape culture (which I recommend to you as one of the best and most practical of all,) that he gets a thousand gallons of wine to the acre, which implies about the same crop I have named. In Massachusetts, we have taken seven tons to the acre. This year, which has not been so favorable a grape year as usual, I had five and a half tons to the acre. I have had seven tons, and other parties, with smaller holdings, have had crops at the same rate. These are crops so constant, that we have come to count upon them. But suppose we take the estimate of the Catawba, of three and a half tons to the acre. At ten cents a pound, the wine-making price, you have $700 to the acre. Three and a half tons, at ten cents a pound, would give you more profit than any other crop known to our husbandry, except, possibly, tobacco, a crop which can be grown only in limited quantities, because, when the market is supplied, there is only one use for it, and the price goes down.

I have spoken of wine-making. I know it requires a little courage to stand up against the prevailing opinion in opposition to the use of wine of any kind, lest it injure the cause of temperance. I have no such belief. I am as friendly to the cause of temperance as any other man can be. I have labored in it, and spent my time and money for it, and if I did not believe from the bottom of my soul that the introduction of pure wine from the grape, under vineyard culture, so that each man could make his own wine, whereby its purity would be assured, would aid the cause of temperance, and abate the use of those injurious drinks that are now so common among us, I would not make a gallon of wine. I know that an eminent writer has been quoted recently as saying that in London and Paris the use of intoxicating liquors was more common and notorious than in New York. A writer on Italy, and a very able man, has said that the use of wine led to very frequent quarrels in Rome, where men poniarded one another, and were up before the courts the next morning. Now an eminent gentleman of this State, who was formerly a Baptist clergyman, and for two or three years a pastor of the Protestant Chapel in Paris, says that in the departments, where they grow the grape and use wine, there is no intemperance, except very rarely, about the large towns and about the taverns. In Paris, he says, the amount of intemperance, in consequence of drinking brandy, was very large; and the moment he got into those districts where they could not make wine, but made beer and drank brandy, he found intemperance. And that is the testimony of multitudes who have written on that subject. I could fill a whole page with the testimony of eminent men who have written books, or whose letters to their friends have been published, corroborating these statements. It is not wise to take a fanatical view of this matter, and to come to the conclusion, that because distilled liquors are poisonous and injurious, and lead to mischief, we are never to use any other. However, I only allude to that point here, because I have proposed the alternative of wine-making. I do not think you will have to resort to that alternative. I have not the slightest idea that all the grapes that can be grown will be sufficient to supply the market at even the wine-making price of ten cents a gallon. And if you ask me how I come to that conclusion, I will state to you a fact. In our Western country, grapes sell for about five cents a pound. Now, Catawba wine is worth about $1.60 a gallon, at the extreme West; at the East, it is sold at a much higher price—about $4; and about fourteen pounds of grapes are required for a gallon of wine. You may be sure, therefore, that if at the West, where the vineyards are most abundant,—I speak of Cleveland, Cincinnati, and the centres of the grape-growing region,—the price is five cents a pound; on this eastern coast, where the price of wine is so much higher, you will always find a market for your grapes at ten cents a pound.

I said there was such a thing as a little wise neglect in grape-growing. We are counselled by all writers on the subject, to train them in a particular fashion,—some with horizontal arms, some with a straight stem upon a pole, to be spurred, some to be cropped the whole length of that stem upon one pole, while a new one grows this year on another pole, to be cropped next year; and all of these methods are successful, but some of them require so much skill and care as to be difficult to pursue; and some of them, especially the horizontal arm-training, leads you occasionally to such a loss of spurs, in consequence of the sap having to traverse that horizontal branch of wood that you have to cut back very nearly to the beginning, in order to get a new arm—losing, of course, one year's crop. I would grow a single stem, high enough from the ground to facilitate the culture about the grape. If I had an espalier, which I think the best, I would let that single stem reach to the lower bar of the espalier, say eighteen inches from the ground. From that lower bar I would lead arms right and left, at an angle of forty-five degrees, until they reached the top of the espalier, which should be six feet from the ground. You have, then, a vine in the shape of the letter Y. The main stem which reaches to the lower bar of the espalier, is never to be allowed to have any spurs or any branches. Those side arms will have spurs, and those spurs will be pruned annually to about three eyes. You see, then, that at the end of the year, when you have done your pruning, you will have two diagonal arms upon the espalier, with spurs to each, at the usual distance of about nine or ten inches, which spurs, being new wood, the current wood, which bears fruit next year, will have a branch from each eye, and each branch will give two or three bunches of grapes. That is the simplest method, and continues from year to year, without difficulty. When you come to the next year's pruning, each one of those spurs of the preceding year will have had three branches. In pruning for that year, you will cut out wholly two of those branches, back to the last branch, which was the first bud on the spur the preceding year, and that you will cut back to three eyes, as before. You can see how easy that method would be.

Now, as to summer pruning. I believe summer pruning to be pernicious. It is the custom to pinch the grape in summer; I have done it until a very recent period, not being aware that with a little neglect I should have a larger crop and a more vigorous vine. And that seems to be very reasonable when you look at it. It is very well to pinch the grape once, at two leaves, we will say, beyond the farthest bunch. If the growing shoot sets three bunches, then at two leaves from the third bunch I would pinch the growing shoot, which would set back the sap to strengthen that part of the wood, and develop those bunches which you leave. It has been the custom among grape-growers, and is still practised among those who think it the best method, to pinch again and again; but during the past summer, I have let mine grow, without pinching, until the growing branches, two or three yards long, have touched the ground, and covered the crop with successive layers of foliage, not lying so close upon each other as to smother the foliage and destroy it, but so close that it would keep off effectually the first frosts of autumn from the ripe fruit. It is necessary that there should be foliage enough to perfectly ripen and make into true sap, the *crude* sap which the root takes up. Nature gets rid of part of the watery particles by evaporation, and part are taken up; but if you have root power sufficient to make three feet of wood, and take away half, the elaborating surface is only one-half what it should have been, and your vine is impaired in some degree in some of its functions. An eminent writer at the West, Professor Kirtland, believes that the bad condition of the Catawba is due to excessive pruning and over-cropping together. He thinks that pruning too close, and robbing the vine of its foliage, have induced a diseased condition of the sap, which has ultimately broken out in the form of rot and canker, which have in some cases destroyed whole vineyards, or prevented their bearing at all, so that they have dug them up, and planted more hardy grapes. Now, the Catawba was a rampant grower in the beginning, and thought to be perfectly hardy and vigorous, and free from all disease; and it had been grown many years before the rot affected it badly, and before these defects manifested themselves; so that it has come to be a saying among grape-growers at the West, in regard to any new grapes, that it remains to be seen whether these kinds that are now enjoying immunity from disease, will continue to have that exemption.

When you consider that the grape lives a thousand years, that it grows to a large size when let alone, that those old vines are always healthy, I think you will see immediately how much better it will be to give your grape extension, and to let it have that way which nature indicates for it so plainly by its rampant growth and habits, than to confine it within too narrow bounds, at the risk of gorging it with unripe sap and inducing disease. There is a vine in Richmond which was measured by two friends of mine, officers of the Thirty-Second Massachusetts Regiment, who came through that city after the surrender of Lee, and found to be forty-eight inches in circumference at the base, and sixteen inches in diameter. There is one vine in New Jersey with a diameter of two feet. Downing mentions one on an island in the Ohio River which had a diameter of two feet, and the branches of which covered more than an acre. These largest vines were estimated by Downing to be two thousand years old, and I do not know why they may not be. There is a bearing vine in New Jersey which gave, two years ago, seventy-eight bushels of fruit which went to market.

These facts which I instance, all go to prove that the grape ought to have a large extension; and if you plant your vineyard, setting your vines eight feet apart, or eight feet by ten, and take crops from it for several years—for ten years, we will say—until the vines get too large for the space, cut out every alternate vine, (which have paid for themselves over and over,) instead of cutting back too closely in pruning. I have no doubt myself that the sap is injured by this engorgement. If you girdle a vine, a very common practice, you increase the size of the wood, and also the fruit beyond the part you have girdled, because you have intercepted the return of the sap; but that wood is more imperfect, and that fruit, I think, is never so good as that made from the thoroughly ripened sap of another vine, where all the processes have gone on naturally, and the return of the sap has not been impeded. I suppose engorgement has some such effect as this, that the crude, unripe sap distends the wood, and it is not so solid, ripe and sound as it otherwise would be, and becomes liable to that disease called canker among nursery-men. Blight, which is sometimes caused in the spring, has an aspect something like that. The young shoot, being pushed forward prematurely by the heats of spring, is blighted by the cold, easterly storms that sometimes follow. That has happened for two years past. In warm, sheltered locations the vine has put forth its shoots two weeks earlier than usual, and the cold easterly storms, with the thermometer very nearly at the freezing point, have blighted those shoots, and they have been discolered and taken on this very form which gardeners call canker. Such wood should never be used for propagation, because the disease is continued. The new growing wood will have the same predisposition to disease, and it will never be so good a vine, if, indeed, it does not go on from bad to worse.

Most of you have vines of your own which you can multiply, and it is better for a man to make his own vines than to buy them, if he can wait for them, because he can then select the proper wood to make vines from, and, when they are made, reject those which are weak. The wood should be sound, short-jointed and well-ripened. Some prefer the long-jointed wood, of a rampant and coarse-growing character. Well, gentlemen, if you were to go into my vineyard, where I do not use manure, you would find, out of twenty-five inches of wood, three, four or five inches, rarely more, of perfectly solid, well-ripened wood, and well-developed buds for bearing the next year. On the contrary, if you find a vine over-fed, ill-fed, heavily-fed, long-jointed, it will be found to have smaller buds, very many of them leaf buds, and very poorly developed fruit buds, which will give you meagre bunches next year. Let me state an instance to illustrate that. I knew a handsome orchard in Norfolk County belonging to a carpenter. He kept it in the finest condition; he was always feeding it and pruning it, and he had very handsome trees, but no fruit. After the old gentleman died, his son left the place, and the orchard was neglected. At the end of two years he came home to find it heavily loaded with fruit.

You must have a proper balance, and then you have fruit and wood in proper quantities. Indeed, the law of pruning would lie in that. If you have excessive root-power there will be too much wood. If you do not have room upon the trellis to lay in that wood, your only alternative is to crop heavily, in which case the strength of the vine goes to the crop, and the balance to wood. If, on the contrary, the root is small, the growth of the top will be less, and every experienced man will be able to see if it is weak, in which case he will prune back pretty closely. But if he has got too much wood, he will see that the root-power is too great, and let it bear heavy crops of fruit, to restore the balance and the force of the vine going to mature the fruit, he will find it manageable.

You see, therefore, that with a little wise neglect, and cheaper processes than we have thought to be needful, you will achieve the highest success. No matter how you train the grape, so long as you have spurs of good wood. So long as it continues to make wood satisfactory to you, no matter what may be the form, though the stem of the vine be contorted ever so much, though it have the most grotesque form, still you will have your crop. Training is more a matter of taste than necessity, except in so far as some forms are more convenient to prune and harvest the grape from than others. There is not the least necessity for training in set forms in regard to crop or quality.

Those ripe cuttings which you will take from the vine should have at least two buds; if very short-jointed, three. Cut them off with a clean, close cut, just below the lower bud, from which point the roots are most copiously emitted, and leave the tip of the shoot one inch above the bud which is to make the vine, that it may project from the ground and be observed when hoeing. Plant the cuttings in mellow earth a few inches apart. Leave the top of the shoot just apparent upon the surface, and that will leave the bud a little less than an inch below the surface, from which place it grows with the greatest facility, giving you no more trouble, except to furnish a slight shade of branches or leaves or anything else, until it has got two or three leaves, in order that the young shoot may not be burned under the powerful heat of the sun. No further care is needed, except to keep the ground clean. Then you will have vines of your own growing, of wood known to be healthy, from which you can select out the best and reject the weak altogether, and so establish a vineyard that shall be sure to have thoroughly healthy vines throughout its whole extent.

As to that part of the vine from which the cuttings should be taken to secure success, it is believed in Europe, and I suppose it to be true, that that wood which is most prolific and produces the best and earliest bunches, is the best to cut from. Experiments made at Thomery, near Paris, have proved that they are the best. At least, all the grape-growers in that vicinity believe that they increase the precocity of the vine by that method.

Let me say a word about the Thomery method. It is substantially the horizontal method. Thomery has not a good aspect for the grape, and the soil is cold. They build up walls of clay, about eight feet high—of the proper thickness to stand—which are covered with boards, both to prevent the rain from breaking down the clay walls, and to shed the water from the vines, which are trained upon an espalier, close to the wall. The vines are planted twenty inches apart. The first one is trained on the lower bar of the espalier, with one arm running to the right. The second one is trained on the second bar, with one right hand arm and another short left hand arm, and so on all the way up, the last one, that comes to the top of the espalier, having an arm running wholly to the left hand. They are closely pruned, and closely planted, which is the custom in France. But it is a question, perhaps, whether they have not debilitated the vine by the effect of too close pruning, and too close planting.

Now, as to feeding, let me instance another fact, from another part of the world, which I think will satisfy you that the theory is perfectly sound, that you must not feed your grape too much; although I want you not to forget that it must have those mineral constituents, phosphate of lime, potash and sulphur, in some form. The application of sulphate of lime, or plaster of Paris, is the best and cheapest method to apply sulphur. Among the Lesser Cyclades of the Greek Archipelago, is a little island called Santorin. It is a volcanic island, which has been peopled for many ages. It has undergone a good many changes from the effect of volcanoes. At one time, it had a peak which rose very high toward heaven, which in subsequent disturbances, subsided altogether out of sight, leaving in the middle of the island a basin, with fissures going to the outer sea, which are now inlets to that haven, for the commerce of the place. The phenomena attending that island are of such a nature and of such interest to scientific men, that many gentlemen have gone there on purpose to study all the circumstances attending the case, and have written some most interesting chapters in connection with it. Among other things, we find that although there is no rain there, although there is no soil there, yet grapes grow there in such profusion, and of such excellence, that it is famous, and has been for ages, for the choice quality of its wine and the great abundance of its grapes. It is stated by one of those visitors to the island, that from one stem, one growing shoot of the current season, forty-eight pounds of grapes were taken, and that the bunches weigh frequently ten or twelve pounds. If, then, the grape, under such circumstances, can attain such luxuriance of growth and such abundant bearing, and such excellent quality besides, without manure, only growing in the volcanic debris of that island, which always abounds in sulphur and lime, the mineral substances which the grape loves more than all other things, watered only by the evaporation of the sea and the nightly fog, you can see how easy the culture of the grape must be in those countries where the vicissitudes of climate do not prevail.

Now, gentlemen, let me say a word about reproduction from seed. I am sure it is only a question of time, and I wish I could inspire every one who hears me with the desire to grow seedling grapes, with a view to the improvement of the delicious fruit, in order that, in the various circumstances of soil and aspect, the chances of producing better grapes and ultimate success might be multiplied; for with the grape, as with all growing things, it is true, that in the same soil and under circumstances of soil and climate always the same, the plants continually reproduced are prone to put on the form of the parent, because it is the surroundings, in part, which make the thing—so much so, indeed, that in some cases a vine or other plant which will thrive perfectly in one place does not succeed when removed from that vicinity.

Let the vine you take your seeds from be healthy and vigorous and not too young. An old and well-established vine is the best. Take from that vine the earliest and largest and best bunch, the bunch having the qualities you desire most, and plant the seeds in the autumn, in a rich bed of earth, thoroughly enriched with nitrogenous manure, thoroughly decomposed night-soil, with bone flour and live wood ashes and a little plaster of Paris. Put the seeds in a row an inch deep, and cover the row with a board, that the seeds may not be disturbed during the winter. If there are cut-worms or wire-worms, or insects likely to disturb the young seedlings when they start, you will find that they will come to the under surface of the board for the sake of warmth, and they are easily destroyed there. When the vines grow it will be necessary to shade them until they have got the third leaf; after that they will endure the severest sunshine without harm; and unless the season be very dry indeed, they will not require water. They will grow with more or less vigor, some more vigorously than others; but out of these seedlings you would be likely to get some absolute improvements. While they are growing in the bed some will exhibit more vigor than others, and those are usually, though not always, the vines which return to the original coarse type, and to the vigor incident to the original vine, and also to its coarse habits. The improvements will usually be found in those which grow with a little less vigor. I do not move them at the end of the first year, because I find by experience that some of the seeds do not grow the first year, but do the second. In the second year a new crop of seedlings will come up in these same rows; and in my experience those seeds which are two years in coming up give the best results. Out of them you get your successes more than out of the others. I have had rampant growers, which I planted out by themselves, supposing they gave some improvements on the old vine; and out of one-eighth of an acre of such seedlings I had five very choice vines, with all the vigor of the original vine, and improvements decidedly worth saving. All the remainder proved either barren or worthless. These seedlings can be planted in rows, not more than two feet apart, and the rows six feet apart, and can be easily looked after from year to year. They are not a great deal of trouble; they grow while you sleep; and the fifth or sixth year they will bear; out of an eighth of an acre you would almost certainly have improvements—perhaps great prizes. The man who can get a grape of a quality equal to or better than the Isabella, which will ripen in August, and be perfectly hardy and prolific, has achieved a fortune of at least five thousand dollars on that day. What we need, what I believe we shall have, is a hardy grape that will ripen in August.

Let me say, while I think of it, that if a grape ripens in the time of the intense heat incident to late August, or early September, the quality is immensely better than the same grape ripened a fortnight later, even though no frost intervene, but only the cool nights, the fogs and cold rains, incident to that season. In other words, you will find the grape to ripen more in three hot days at the end of August, than in ten or twelve days of weather not absolutely frosty, not checking the growth, but less propitious by reason of the coolness of the air, and too much moisture. The sugar is more abundant, the sap of the grape is changed into its ultimate properties more rapidly, there is more flavor, a more delicate and more vinous flavor, and it is better in every way. Therefore, we want an August grape, and that unquestionably we shall have. Plant seeds, then, gentlemen, and grow the grape ; and whoever gets that August grape will make a fortune that day, besides having done the public a great service, which will be equally a satisfaction to him.

I do not speak of cross-breeding, because there are difficulties attending it. As I have said, two gentlemen of this city have been, so far as I know, the only persons who have absolutely succeeded in obtaining true hybrids, as they call them, between foreign grapes and natives. Accidentally, hybrids may happen. I use that term hybrid from habit, and because it is the word in common use ; but cross-breeding is the proper term. If the stamens of one grape are defective, and there is growing near it, and over it, a grape having perfect stamens, if at the time of inflorescence, the pollen of the upper grape happen to be shed upon the pistils of the lower grape, then true cross-breeding takes place, spontaneously. That is possible. But practically and really, it is so difficult to impregnate one grape with another, it is a work of such delicacy, and art, and skill, that I do not recommend it to you, because you would be likely to be deceived into the idea that you had got a cross-breed, when perhaps it was only a direct descendant. I would rather leave it in the hands of Mr. Rogers, who has achieved such eminent success, and who, if the thing can be done in that direction, is sure to do it.

Gentlemen, I have detained you too long; but if you will allow me, I will read to you a few statistics compiled from authentic sources in Europe, and published by Colonel Haraszthy, a gentleman, whom the State of California sent out to Europe, to obtain from there all kinds of vines which he supposed could be grown in California, with a view to making the grape a staple in that State. You will see from these figures what an immense interest it is to be developed, and although the price—twenty-five cents a gallon—seems to be an insignificant price, yet the cultivation of the grape, in all those countries where it is possible, is found to be so much more profitable than grain or any other crop, that every rod of ground, every rocky corner, though they have to break it up with pick and spade, is planted with grapes.

Here is a copy from the records of the Agricultural Society in Wirtemberg. These records, dating from the year 1246, are, from that time up to 1420, very meagre and much interrupted; but from 1420 up to 1852 quite correct and complete. During those 430 years, there were, as to the quality of the wine,—

Those eminently distinguished, only	11
Very good years for a good wine,	28
Pretty good ones for a good wine,	118
Middling quality wines,	76
Inferior quality wines,	199
Total,	432

Concerning the productiveness, there have been—

Years of ample yield,	114
of middling yield,	18
of poorer yield,	99
of failure, or yields not paying expenses,	201
Total,	432

The aggregate number of acres under wine cultivation in Europe is 12,285,780.

The total aggregate yield per year in Europe is 3.107,039,000 gallons.

The wines of Germany would bring, at 25 cts. per gallon,	$13,026,250 00
And those of other countries,	763,733,500 00
Together,	$776,759,750 00

The statistics in regard to the quality of the wine and productiveness relate only to Germany. Other tables show that in Italy and the south of France the wine crop is not only more abundant, but more constant and more profitable than in Germany. But although Italy is the very garden of the vine, and some of the choicest wines are produced there, such is their careless habit in the manufacture, that they furnish very few wines of indubitable excellence for export. Yet the annual product per acre in Italy exceeds that of any wine-growing district in Europe—431 gallons to the acre; while the product in France is from 200 to 250 gallons to the acre, according to the season; and that of Germany is 136 gallons to the acre.

Now, if under these circumstances of low prices and almost half the seasons unfavorable in Germany, grape-growing is still the most profitable agricultural pursuit, I think we may go on with the absolute assurance that we cannot fail to succeed in making the crop profitable, and more profitable than any other crop; and very possibly we may find the alternative that will keep our children at home. Grape-growing is the poetic phase of agriculture. The culture is easy, the harvest is delightful. Except ploughing the land once or twice during the season, the women and children could take the whole care of the vineyard, and when at last the crop is harvested, the product from a single acre is often more than the product of a whole farm besides.

Take another point of view. Many a poor man finds it difficult to support his family and educate his children as the circumstances of the time and the advancing standard, which is ever rising, make it necessary they should be educated, and spends his life-blood in merely keeping the place which he has bought, merely succeeding in educating his children, with the most severe toil. Let him have his half acre or acre of grapes, from which he would get, possibly, $1,500—$2,000 has been realized,—surely, $500 per annum; and you can see how that moment, you lift that man, who was a slave to the ground, to competency and independence. Of course, his income will give him leisure for reading, enable him to buy books, and cultivate his love for art and literature, and make him such a man as an intelligent American citizen ought to be. I confess to you, gentlemen, that that aspect of the case gives me more pleasure than all others.

Mr. RUSSELL, of Salem. I would like to ask Mr. Bull whether the Concord is a seedling of the fox grape, the Isabella, or some cultivated variety.

Mr. BULL. The Concord grape is a seedling from a seedling of the wild grape. I do not wonder that my friend asks whether it is a seedling of the wild grape or the Isabella, because it is so common to suppose, from certain resemblances it bears to the Isabella, that it is a seedling of that.

Professor AGASSIZ. How does it behave to other grapes, as to cross-breeding?

Mr. BULL. I crossed the Chasselas and Black Hamburg with the Concord, at the earnest solicitation of Colonel Wilder, and succeeded in getting true cross-breeds. They were planted out and sheltered for the first year. One hundred vines grew. The next year they were exposed, without protection, because I did not want tender vines, and all of them but one died. That is a cross between the Chasselas and the Concord, and although alive, it is feeble to this day. That is, it makes a small growth of wood, and needs protection.

Professor AGASSIZ. How far are the various cultivated grapes traceable at this moment to their wild stock?

Mr. BULL. I do not know a single one whose history is so securely established that we can trace it to any wild stock. The "Clinton" is supposed to be a child of the Frost grape, and the "Elsinburgh" of the Riparia, or river grape; and that, I suppose, is as far as we can go. We have the Muscadine at the South-West, to which several of our new grapes are referred, but so far as I know, it is all guess work.

Mr. RUSSELL. I would ask if it is not all guess-work with reference to this matter? For instance, Mr. Bull says the Concord is a seedling of a seedling of the Labrusca. Was that seed gathered in the woods or in his garden?

Mr. BULL. I have always stated that the first vine was an accidental seedling, growing on the line of a fence where the birds or the boys had probably dropped the seed. That was the wild grape, and undoubtedly the Labrusca. There was not then a vineyard in Concord. There was not a vine of the Isabella growing within a mile of me at the time. I had in my own garden vines that I carried from Boston which I could not make succeed. I had the Catawba, the Isabella, the Chasselas, and the Black Hamburg.

Mr. HASKELL, of Ipswich. A few of the theories espoused by Mr. Bull are not sustained by my experience. In the year 1851 I commenced planting the seeds of the wild grape, the best that could be found in our vicinity—the Labrusca it is called, although I think there is but one species in the country. From these seeds I produced thousands—perhaps tens of thousands. I had a large body of them; and from them all there were only two or three that I thought worth propagating or preserving, and I have them still. They are quite good for a swamp grape, but not worth cultivating. Finding that did not succeed very well, I then commenced grafting the foreign upon the native, and the native upon the foreign, under glass, planting the seeds of the vines that were inarched. Those seedlings did not succeed any better. The foreign grape matured upon the native stock was not hardy at all; the vines all perished in the winter. I then instituted another experiment, by inarching upon a growing shoot. After a bunch had just been formed upon the foreign, I inarched the native shoot over the foreign fruit. I then took from the foreign vine its own foliage, compelling the fruit to be matured and nourished by the native foliage. I continued that experiment year after year; and after the vines had become well united, I severed the foreign vine from its own root, so that it would be the foreign seed, maturing its growth and ripening its fruit on the native root and under the native leaf. But that did not harden the seedlings. They all mildewed—and that means winter destruction; for any vine that will mildew will perish in the winter.

A year or two ago I began cross-breeding, using the pollen of the foreign upon the native, and the pollen of the native upon the foreign. I have hundreds of those. They have not, however, yet furnished any fruit. It is only four years since the first was put out. But one fact is clearly established: it hardens the foreign vine. I have stocks from the Moselle, the Frontignan and the Black Hamburg, that were only three years old last winter, upon a four-foot trellis, that were not protected at all. They went through the summer without mildew and the winter without injury. But another effect of the cross-fertilization has been very unfortunate. The vines were so thrifty that I thought it was too bad to lose the wood until they bore fruit, and I took cuttings from them which I set out last spring. When the select vines from these cross-bred seedlings, upon which I depended so much, began to show their clusters, I was still more encouraged by the size of the clusters, which equalled the foreign; but every one of those seedlings had imperfect flowers—conclusive proof of cross-fertilization. One of the Black Hamburgs set fruit that grew to the size of pigeon berries, but they did not come to anything. It has been a matter of excessive labor and care, and what will come of it I cannot tell. I have not found any fruit yet that I thought worth cultivating; but I think that is the only way of getting one. On sandy soil the Concord is a good grape, but in our heavy, clayey soils it is but a little improvement upon the native grape. By cross-fertilization I think we shall obtain something good in fruit and hardy in vine. We have two or three varieties, as I call them, of the wild grape very abundant in our town. This pigeon grape is really a weed on my premises, and in the lower grounds we have the Labrusca and the fox grape. I think, however, as the gentleman from Concord suggests, that it would be well to have experiments carried on in every direction, and for every gentleman to put in seed. I plant the seeds of all the good fruit I eat; and if every farmer would save the seeds of the fruit which he eats at his table, and plant it in some out of the way place, covering it for a time so that the young shoot shall not be browsed by every calf that comes along, or trodden down by the children, we should have grapes by-and-by as abundant as grass. I have now twenty-four different crosses. I have the native on the foreign, the foreign on the native; the pigeon on the foreign and the Labrusca on the foreign, and the reverse of that; the black on the white and the white on the black, to see what influence that might have upon color. I have got 421 vines, every one of which is subjected to careful examination as to mildew and everything about it; so that, if a vine bears fruit that appears to be good for anything, I can know whether it has ever mildewed or been winter-killed.

A gentleman inquired of Mr. Bull whether he had raised any seedlings from his Concord grapes, and how many proved abortive.

Mr. BULL. Not less than nine-tenths. One-tenth would produce fruit, and one in a hundred would be good—worth saving. I have kept a record of everything I have done in this matter, in order that my experiments, successes and failures should not be lost to other experimenters.

Adjourned to Thursday at 9 o'clock.

THURSDAY, December 13th.

The Board met at the hour of adjournment, JOHN B. MOORE, of Concord, was chosen President, *pro tem.*

On motion of Mr. Bull, it was voted, that when the Board adjourns this evening, after the lecture by Dr. Nichols, it adjourn without day.

HENRY K. OLIVER, of Lawrence. As the discussion proceeded yesterday in regard to the rearing of horses and herds, it appeared to me that I had heard or read something near akin to the general strain of remarks, and I cudgelled my memory to see where it could be I had met with it. On going home last night, I went to my library and took down an old book, and on turning over two or three pages, I found the germ, the small germ, perhaps as small as the turtle's eggs that Professor Agassiz referred to yesterday, of what was said here on the subjects to which I have alluded. The world is said to be repeating itself all the time, and it occurred to me that there had been just that unconscious repetition here, and I thought it might amuse the audience if I should read a few lines, which express just what was brought out yesterday. This is a very old writer. He has been dead a great many years. He lived in the times of the best literature of Rome, about the time of the Emperor Augustus, not far from the date of the birth of Christ. He left four treatises on agriculture. I see by the smiles of some gentlemen that they have guessed to whom I refer. They say, "We guess he has pulled down the writings of old Virgil." You are right; and it is singular how the current of remark that was developed yesterday, finds its analogue in this old book.

"A time will come, when my maturer muse,
In Cæsar's wars, a nobler theme shall choose,
And through more ages bear my sov'reign's praise,
Than have from Tithon past to Cæsar's days.
The generous youth, who, studious of the prize,
The race of running coursers multiplies,
Or to the plough the sturdy bullock breeds,
May know that from the dam the worth of each proceeds.
The mother-cow must wear a low'ring look,
Sour-headed, strongly-necked, to bear the yoke.
Her double dewlap from her chin descends,
And at her thighs the pond'rous burden ends.
Long are her sides, and large; her limbs are great;
Rough are her ears, and broad her horny feet.
Her color shining black, but flecked with white;
She tosses from the yoke; provokes the fight;
She rises in her gait, is free from fears,
And in her face a bull's resemblance bears;
Her ample forehead with a star is crowned,
And with her length of tail she sweeps the ground.
The bull's insult at four she may sustain;
But, after ten, from nuptial rites refrain.
Six seasons use; but then release the cow,
Unfit for love, and for the lab'ring plough.
Now, while their youth is fill'd with kindly fire,
Submit thy females to the lusty sire;
Watch the quick motions of the frisking tail;
Then serve their fury with the rushing male,
Indulging pleasure, lest the breed should fail."

* * * * *

"Yearly thy herds in vigor will impair;
Recruit and mend them with thy yearly care;
Still propagate, for still they fall away;
'Tis prudence to prevent the entire decay.
Like diligence requires the courser's race,
In early choice, and for a longer space.
The colt that for a stallion is design'd
By sure presages shows his gen'rous kind:
Of able body, sound of limb and wind,
Upright he walks, on pasterns firm and straight;
His motions easy; prancing in his gait;
The first to lead the way, to tempt the flood,
To pass the bridge unknown, nor fear the trembling wood;

Dauntless at empty noises; lofty-necked;
Sharp-headed, barrel-bellied, broadly-backed:
Brawny his chest, and deep; his color gray;
For beauty, dappled; or the brightest bay:
Faint white and dun will scarce the rearing pay."

I think that point will be remembered, as having been pretty thoroughly settled yesterday.

"The fiery courser, when he hears from far
The sprightly trumpets, and the shouts of war,
Pricks up his ears, and trembles with delight,
Shifts place, and paws, and hopes the promis'd fight.
On his right shoulder his thick mane reclin'd,
Ruffles at speed and dances in the wind.
His horny hoofs are jetty black, and round;
His chine is double: starting with a bound
He turns the turf, and shakes the solid ground.
Fire from his eyes, clouds from his nostrils flow;
He bears his rider headlong on the foe.

* * * * * * *

"But worn with years, when dire diseases come,
Then hide his not ignoble age at home,
In peace t' enjoy his former palms and pains,
And gratefully be kind to his remains.
For, when his blood no youthful spirits move,
He languishes and labors in his love;
And, when the sprightly steed should swiftly come,
Dribbling he drudges, and defrauds the womb.
In vain he burns, like hasty stubble fires,
And in himself his former self requires.
"His age and courage weigh; nor those alone;
But note his father's virtues, and his own:
Observe if he disdains to yield the prize,
Of loss impatient, proud of victories."

I was struck with the resemblance of these lines to what was said yesterday, and thought it might be interesting to the gentlemen present to hear them.

ROOT AND OTHER FIELD CROPS.

Mr. HUNTINGTON. I have been requested to open this discussion, and I must preface what I have to say with the remark, that, as the gentleman has just said upon another topic, there is very little that is new to be said upon this subject. Our agricultural reports embody about all our information upon it, and they are accessible to almost every one. But it is worth something, perhaps, to make a declaration of belief. There is certainly a want of faith in the cultivation of root crops generally, and it is necessary for us occasionally to make our declaration of belief in their utility. It is worth something to impress this fact upon the minds of those who hear me ; as much so as it is necessary for the minister, though he may have nothing particularly new to say from Sabbath to Sabbath, to repeat the old truths, until he shall impress them upon the minds of the community. Therefore I want to express my hearty belief in the utility and value of the root crop for cultivation. I do not believe that roots are cultivated half enough. We admit the importance of this crop in one particular, at least. It cannot be denied that the potato crop, at least, is of great importance, when we know that a few years since a whole people came very near starvation on account of the failure of that crop. It would be a superfluous work for me to attempt to convince the farmers of Essex County that they ought to raise potatoes. Every man must have his field of potatoes as much as his field of corn or his grass field. If I could claim that I had some plan of raising the potato by which the crop would be increased one-quarter or one-third, I have no doubt I should be listened to with interest, whether I made out my case or not. But I do not propose to speak of the potato crop, because it is unnecessary to impress upon the people the necessity of raising it ; and I suppose the object of the discussion to-day is more particularly to show the value of roots as stock feed.

I alluded to the want of faith in the value of the crop. There are certain objections in the minds of people to the more extensive cultivation of roots, and one of those objections is the uncertainty of the crop ; and I have no doubt there is something in it. You go among the farmers and inquire why they do not raise carrots, or turnips, or ruta-bagas, or beets, and they will tell you they do not succeed with them—that they do not pay. Their experience, perhaps, may have been very similar to what mine has been within the last eight or ten years. Some eight or ten years since I went on to a new place. I had always been used to raising roots, more or less, and I was the more anxious to do so then, because I wanted to break up land,

and in order to do that I wanted to make manure. I knew I must keep stock, and the only way to increase the capacity of the farm for raising stock was to increase the crop of roots. I went into it to some extent. I began with ruta-bagas, and succeeded very well for two or three years; but finally the crop, from some unaccountable cause, took to rotting, and failed. They began to rot more or less before I gathered them, and continued to rot after they were gathered, so that I became discouraged in regard to that crop. I did not know how to manage it, and do not know. I do not know whether the rot was merely a temporary evil or not. Then I determined to try other kinds, and took carrots and beets. I succeeded very well with carrots for two or three years; but then came a year in which I had prepared my ground with the usual care, and my crops came up, but they did not grow; and when I came to gather them in the fall, the carrots were little things, not bigger than my finger. That discouraged me, and I suppose it would any farmer, because there is a good deal of expense attending the preparation of the ground and the cultivation of the crop, and if there is a failure in the end it is discouraging.

Another objection is the character of the labor required. We all know that there is a great deal of labor and expense involved in cultivating a crop of roots as it ought to be cultivated; and I do not know how it is, but farmers generally have a distaste for getting down so near the ground as is necessary to bring forward and cultivate a good crop of roots, unless they are very sure it is going to pay them an extraordinary profit.

Another objection urged is the want of value in the crop. Some farmers will tell you that the roots are most all water; that they don't amount to much after you have raised them; that there is so large a percentage of water that you had better raise Indian corn or something more solid. But I have noticed one thing in regard to that—they do not make that objection about potatoes, because we want potatoes for our own use, and will have them if they cost a dollar or a dollar and a half a bushel. We think they are necessary to our health and comfort; but we do not reflect, it seems to me, as we ought, that they must be just as necessary to the health and comfort and the economical feeding of our stock as to ourselves.

Now, in regard to the best manner of cultivating the crop. I have nothing new, perhaps, to say on this subject. I can only give you the result of my own experience. There are several things that ought to be attended to with great care, and one is the selection of seed. This is a matter which I consider of prime importance; for if you happen to get poor seed, or seed that will not germinate, your whole operation is frustrated in the beginning; you are thrown off the track, and do not know what to do with your land if your seed does not come up. In my own case, if I do not get a good start of the seed, I have almost always found that I do not succeed in getting a good crop. Therefore I consider the obtaining of proper seed a matter of prime importance, and I suppose there is no surer way of doing it than for a farmer to raise his own seed. If he does, then he ought to select carefully the best specimens among his roots—those that are of good size; that grow smooth, and fair, and sound. In that way he will be pretty sure of getting seed that will not disappoint his expectations. If he is obliged to buy, he ought to take the greatest pains to get his seed of a reliable dealer. I know it is a difficult matter, for I have been many times disappointed in this particular myself. I have bought turnip-seed, for instance, and got for a crop something that would run to top, but make no root—a great coarse, good-for-nothing thing. I was told, only a day or two ago, of a gentleman, a member of the Board, I believe, who bought in Boston a very nice marrow squash, which he was told by the man who sold it to him was a genuine article, raised by himself. He took the squash home, saved the seeds, planted them by themselves, so as to be sure of having a nice crop of squashes, took a great deal of pains, and did have a good growth; but when they began to set he found that three-quarters of them were very good pumpkins, and not squashes. This shows the importance of getting good seed to begin with.

Then the next thing is the proper manuring and proper cultivation of the soil. Here, again, perhaps I may as well give my own experience; there are others who will give theirs. I have succeeded best in applying my manure in a green state, or taking what I have made through the summer on to the land in the fall, and covering that manure by ridging the ground; not ploughing the whole ground, but throwing one furrow upon the crown of another. The advantages of this, I think, are that it covers the manure sufficiently to insure partial decomposition by the time you want to prepare the ground in the spring. The land is then in a light, friable condition ; you can break up the furrows by cross-ploughing, and the ground is very easily fitted for the reception of seed. I think that manure tells better on a root crop applied in that way than in any other. I think you can get a better article—certainly you can of some kinds of roots—by using manure partially decomposed in preference to that which is fresh and green. In addition to the barn manure, unless my land is in a high state of cultivation, I use some kind of special manure in the drill when I sow my seed. I have found nothing better for this purpose than good superphosphate. The after cultivation of the crop consists in keeping the weeds down ; and we all know that if we do not pay attention to that, at just the right time, we injure the crop seriously. Farmers are very apt to neglect their root field for a few days ; and if they do neglect it for a few days, at certain seasons of the year, it is most disastrous to the crop ; or, if that is not the result, it increases very materially the expense of cultivation. You take a field of carrots that is nearly covered with weeds, and undertake to get those weeds out thoroughly, and you damage the crop, if not quite as much as you do the weeds, to a great extent at least. Therefore, I say, a field of roots never should be suffered to get weedy. It is in vain to expect to get a crop without thorough cultivation.

Then in regard to gathering and using the crop. A great deal may be done in the way of economizing the labor by a proper arrangement. I do not know what the common practice is in regard to topping them, but in my case I have found nothing better, in harvesting carrots, than to go along with a hoe and take the tops off with that. I then plough a furrow as near as I can to the side of the row, and take a spade or shovel and raise the roots. They are then easily pulled out, thrown into heaps, and put into the cart. Roots are gathered with great facility in that way. There should be a scuttle to the cellar under the barn, so that whole cartloads can be put down at a time. Every arrangement that can be made for the easy handling of this crop is a matter of great importance, for this is one of the principal objections we find to many of these crops—the labor required in handling them.

I want to say a few words in regard to the common English turnip. I think those who are inclined to go into the cultivation of roots may very well begin with this; and I am sure they might manage it in such a way as to involve very little labor or expense. I know very well it is one of the least valuable of all our crops; but then, again, it is the one most easily raised. A piece of sward land, after the grass is taken off, may be turned over, and three or four hundred pounds of phosphate applied in the drill. I would not sow broadcast; I do not consider that the best way. I would drill in the seed, and put this superphosphate as near as I could in contact with it. I have found that almost a sure way of raising turnips. I never have failed to raise them. It seems to me just as sure an operation as any other farm operation we can undertake. This last season I had a small patch of onions, which, because I had no manure for the piece at all—starting a new place entirely—I manured with superphosphate. I spread it on in pretty large quantities broadcast, and put it in the drill also, and sowed my seed. The onion crop did not do very well on account of the ravages of the worms and maggots, and about the last of July I went on to the field and sowed a few turnip seed. The ground had been cleaned up so thoroughly that no weeds of any consequence grew afterwards, and I had as fine a crop of turnips as I ever raised in my life—very large, very fine, and very sweet. I have done the same thing before, and have got at the rate of five or six hundred bushels to the acre. All the labor there was about it was sowing the seed and gathering the crop, very little more than it would be to go into the field and mow grass for your cows and cart it to the barn.

As I said before, I have nothing new to say upon this subject. What I have said is merely by way of opening the discussion. Other gentlemen are much better able to carry it on than I am.

Mr. Perkins. I wish the gentleman would tell us what time he put in the ruta-bagas, and when they commenced rotting.

Mr. Huntington. I planted them about the twentieth of June. I managed the crop just as I always had, and have no means at all of judging why it operated as it did. And with me it grew worse and worse. The first year the crop was very good; the next year they did pretty well; but I could see now and then, in the crown of the root, a defect. The next year they did not bottom near so well, and rotted a great deal more.

Mr. Perkins. How large were they when they commenced to rot, and in what season of the year was it?

Mr. Huntington. Along in September, after they got well growing. Some of them would be quite large. I did not observe much about it until a few weeks before I began to harvest them.

Mr. Bull. Were those crops grown upon the same ground each year?

Mr. Huntington. No, sir; new ground.

A Member. What, in your judgment, is the value of the common English turnip compared with the ruta-baga?

Mr. Huntington. I cannot tell anything about it from experiment. All I judge from is by what chemists tells us. I think that the ruta-baga contains only about ten per cent. of nutritive matter. Is it not so, Dr. Loring?

Dr. Loring. So it is stated. I do not know the comparative merits of the two, except that the ruta-baga is a root for storage and long feeding; the English turnip is not. It does not amount to anything after the early part of the season. It is a root you cannot keep to advantage.

Mr. Huntington. I forgot to mention one way in which I know of the English turnip being raised to pretty good advantage very cheaply. I do not know whether it has ever been practised in this part of the State or not. A neighbor of mine, when he wants to lay down a piece of land to grass, where the land is in pretty good condition, will sow turnip seed with the grass seed. Of course he does not cultivate it at all, and in that way he secures a pretty good crop of turnips without any labor, except gathering them in the fall, and without any injury to the grass next year.

A Member. How do you prepare your turnips for the cattle? Do you take pains to remove the dirt from the roots? If the land is rather wet when they are gathered, there will be quite a quantity of dirt that will remain on the turnips. Do you take pains to remove that dirt, or do you cut them up with the dirt that adheres to them?

Mr. HUNTINGTON. I generally get rid of the dirt in this way. I pull up my turnips in the field and let them lie for a number of days. I think they keep a little better in the cellar if they are a little dry on the outside. In handling them over the dirt will mostly come off, unless they are very dirty. I never have found it necessary to take off the dirt in any other way.

Mr. STEDMAN. I want to inquire of the gentleman in regard to the seed of his ruta-bagas—whether it was seed of his own raising, or whether it was imported each year?

Mr. HUNTINGTON. I think the seed I used was some I bought. I should not think it was imported seed.

A MEMBER. Carrots, according to analysis, are not worth quite so much as ruta-bagas. I think carrots have about eight per cent. of nutritive qualities, ruta-bagas ten, and the common turnip about six. The carrot is not worth so much for feeding purposes as we generally give it credit for.

A MEMBER. I would inquire if that is the general opinion among those who have fed the carrot and ruta-baga? Whether they do not consider the carrot worth more, taking all classes of stock into consideration, than the ruta-baga?

Mr. HUNTINGTON. I never have made any experiments to ascertain that fact. I only know what chemists tell us. It may be that it is worth more for feeding than the ruta-baga, though analysis does not show it.

Mr. STOCKBRIDGE. I wish to inquire what effect it has upon the subsequent crop to raise root-crops upon the land? If you raise English turnips or ruta-bagas upon a sandy loam, what effect does it have upon that soil for the subsequent crops? That is the first question we ought to settle. It may be that it would injure a sandy loam very materially to grow turnips upon it, while it might not injure a clayey loam. I wish gentlemen would answer this question according to their experience.

Then, again, after having secured the crop, I desire to know how that crop shall be stored: whether you are to pile those roots in the cellar, one, two or three thousand bushels in a pile.

Then the next question is, in relation to feeding. What is the best method of feeding turnips? Shall they be cooked, or fed in their raw state?

These three points I would be pleased to have brought clearly and distinctly into the discussion; and there may be many others here who would like to have those questions answered.

Mr. Benjamin P. Ware, of Marblehead, having been called upon, said:—

I have had some experience in the raising of roots, and I will endeavor to relate it. I was very much interested in the gentleman's (Mr. Huntington's) remarks, with reference to his experience. They agreed, in many respects, entirely with my own; but I think in some particulars, we, in Marblehead, have been able to make some improvements, particularly in the harvesting of carrots. He said he topped them with a hoe, ploughed a furrow as near as possible to the row of roots, and then loosened the roots with a spade or fork. Our method is to top them, either with a hoe or shovel, (we generally use a shovel,) and then use a subsoil plough; and so far as my experience goes, it is the only use to which a subsoil plough can be put to any advantage in our county. Previously to ploughing, the tops are raked off the field, so as to be entirely out of the way. We then run the subsoil plough directly by the side of the row of roots, which lifts them out of the ground about two inches; then with potato diggers, forks or hoes, we go along and rake them out, so as to lift them from the ground, and throw them inward, leaving room for the team to go through again. We first turn a back furrow in the centre of the piece, and go round that back furrow, drawing the carrots into the centre, and leaving a space for the horse or ox to travel, without treading upon the carrots. That leaves them spread all over the surface of the ground. We do that in the forenoon; work until noon ploughing out; and in the afternoon, we pick them up, throw them into the carts, and put them into the cellar. As the gentleman suggested, that gives about half a day's time for the carrots to dry; and in picking them from the ground and throwing them into baskets, the dirt is mostly shaken off; so that, if the weather is suitable,—and dry weather ought to be chosen for the harvesting of roots,—they will go into the cellar dry, which, in my opinion, is very important.

Mr. Huntington. This subsoil plough is used on the left side of the rows?

Mr. Ware. Yes. The lifting principle of the plough is on the right-hand side, and that just lifts the carrots out of their beds. You must be sure to go deep enough to reach the carrots. Sometimes the plough will run a little too low, and break off the tips of the carrot, but that we do not regard as of any consequence.

The variety of the carrot is very important. I liked very much the remarks of the gentleman with regard to seed. We think the whole success of our crop depends upon the seed we sow, and we invariably raise our own seed; or, if by any accident we fail, we go to a neighbor, whose crop we know about, and depend upon him. The last resort of all is the seed store. We have a carrot, by the way, that is a slight variation from the long orange carrot, so-called, that sometimes grows very long, and the short-horned carrot, which is rather short; though the horned carrot, I believe, will produce about as large a crop as the orange carrot. It is a heavier root, so that twenty-five bushels of the horned carrot will usually make a ton, while forty bushels of the orange carrot are required to make the same weight. Therefore, if we don't get so much bulk with the horned carrot as with the orange, we get an equal weight, which we most desire.

With regard to storing carrots, we think it is very important to avoid harvesting root crops until as late in the season as possible. I myself usually commence about the 1st of November, feeling that it is safe to risk the roots in the ground until the 10th or 12th of November. I don't like to be caught with my roots in the ground later than that, although oftentimes it would be safe to leave them in later. As far as my experience goes, it is safe to risk them until that time; and by putting them into the cellar as late as possible, heat is avoided. Of course we have to stow them in large bulk, and if it is warm weather, they will sweat and grow and rot in the cellar. Therefore I put off getting them in as late as possible, and after they are in the cellar, I am very careful, on cold nights, to open the windows and scuttle-doors, to get as much air in the cellar as possible; and if we have a warm rain, I close the cellar up as tightly as possible to avoid that; and in that way, I usually manage to keep my crops without heating at all. Ruta-baga turnips are more liable to heat, I believe, than almost anything else. They seem to have a quality that generates heat in themselves, and they require more care, I think, than carrots, or perhaps any other root.

My opinion in regard to the value of the different root crops is, that carrots are superior to ruta-bagas for the general feeding of stock. I prefer that crop to any other root crop, not only because of its superiority in value, but I think it leaves the ground in better order for future crops, than almost any other crop we can raise. It seems to me that it exhausts the land very much less than a mangold wurzel or ruta-baga crop, and, I think I may say, than any other crop.

One word in regard to ruta-bagas. The gentleman told us he sowed them the twentieth of June. I think that is the secret of the rotting of his crop. Ruta-bagas sown early will mature early, of course, and will very frequently get what we call lousy. They get diseased, the tops turn white, and I have known them frequently to rot. Ruta-bagas and turnips that are sown for the early market, if they are not all harvested before fall, are very apt to get into a diseased condition. The best ruta-baga crop I ever raised, I think, I sowed after harvesting my early potatoes, which must have been as late as the 25th of July, and I think later than that. The land was in good order, of course, rich, and the turnips grew rapidly, were very handsome and smooth, and a very large crop, with no labor except harrowing the ground, sowing the seed, and perhaps hoeing once—very little labor indeed, and a very handsome crop secured. Our method of raising the English turnip invariably is to sow them after gathering a crop of early potatoes ; and, by the way, in our vicinity we raise very little else than early potatoes. Our object is to get our crop into the market before they can come from the East, thereby securing a good price. The whole crop raised in our town this year brought from three to five dollars a barrel, which was a good price, and made a very profitable crop.

I believe the gentleman (Mr Stockbridge,) inquired with regard to the feeding of roots—whether it is best to give them steamed or raw. If I am fattening hogs, and want to give them meal and grain, I cook the roots and mix the meal in, so that it is all cooked and steamed. I think for fattening hogs cooked meal is better than raw. But I will state that I have kept successfully, for years, store hogs and breeding sows, from November until March, with nothing at all but raw mangold wurzels. On one occasion I had an old breeding sow, of the Chester County breed, that was fed with these mangold wurzels immediately after taking away the litter of pigs, and in March she was really too fat for breeding purposes. I don't approve of feeding raw roots to small pigs ; I don't believe they would thrive ; but store hogs, weighing from 125 pounds upwards, will thrive well on raw mangold wurzel, and nothing else, from November until March, and even later, if the pigs don't come so early. I think that fact proves that raw roots are good for stock of all kinds and hogs. In my own opinion it would be more desirable to steam roots for hogs than for horned cattle. After my hogs have been accustomed to feeding upon raw roots, I have cooked them, without making any addition, and they would prefer the raw roots to cooked ones.

Another reason for my preference for carrots, is that I can get, I think, larger results, with the same labor and cost, than from any other root. It is not uncommon with us to raise more than thirty tons to the acre ; I myself have raised between thirty-five and thirty-six tons of carrots to the acre ; and less than twenty-five tons would be considered a small crop with us, which, I think, is larger than you would get from perhaps any other root. Mangold wurzels, no doubt, would exceed that ; but with turnips of any kind I think it would be very difficult to get anything like that amount. I raise mangold wurzels with carrots, from the fact that I have found them so valuable for store hogs ; but the large proportion of roots that I raise is carrots.

A MEMBER. Do you raise two crops ?

MR. WARE. No, sir. As to the time of sowing carrots, I think that very important. If they are sowed too early, they, too, will become lousy and diseased, and there will be more or less rot among them. My rule for sowing carrots is the 25th of May, or as near that as possible. If for any reason it is postponed until the first of June, I care but very little about it. But the 25th of May is the time. The difficulty about sowing the first of June is, that I have noticed, and have sometimes been caught, that the first ten days of June are apt to be very dry, warm weather. If they are, the carrots, when they come up, are so delicate and small that they are very apt to get sunburnt and destroyed. Were it not for that, I would as soon sow the first of June as the 25th of May.

I like to sow just the amount of seed that I desire to have grow, to avoid the necessity of thinning. Thinning a crop requires as much labor as once weeding. If you can sow just the required quantity you have saved that labor. Three and a quarter pounds of seed, if sowed properly, is enough for an acre. I raise and prepare my seed myself, and know that every seed I put into the ground will grow; and I can regulate my machine so that it will not vary two ounces from the quantity of seed that I require for an acre. I use Willis's machine, which, I think, is the best. I have made one of my own, with a double hopper, and sometimes, if I think best, I sow with the seed some special fertilizer; though I am very sorry to say that some of those special fertilizers that I have bought and paid for and sown have not amounted to anything at all. But I have used fertilizers in that way, and I have a machine made with a double hopper for the purpose of sowing the fertilizer and seed at the same time; and if the fertilizer is good for anything, it is just exactly where the seed is, so that the early plant will get the benefit of it.

With regard to manure, I liked the remarks of the gentleman with reference to applying it in the fall. I have myself, this fall, applied manure that I had made through the summer to about four acres, that I design for the root crop next year, and ploughed it it. It prepares the ground very nicely for the next year's crop, and helps very much the spring work, and we are always so hurried in the spring, where we attend to gardening, that if we can do a part of the work in the fall, it is a very great help. If we apply our manure in the spring, it must of necessity be composted; that is, pitched over two or three times, to have it cured, ripened and matured. I shouldn't think of raising a crop of roots from green manure. I should expect to raise a large crop of tops and a small crop of roots; but with matured, ripened, well-mixed manure, compost manure, the tendency is to roots rather than to tops; and by applying the manure in the fall, even if it is green, it will become properly matured by the time it is wanted for the plants. I never use less than six cords to the acre—seldom more than eight. From six to eight cords of good compost manure to the acre is my rule for manuring land for root crops. That seems to answer the purpose very well.

As for the depth of ploughing, I usually plough seven or eight inches deep, for root crops generally, with the exception of onions, for which I should not plough so deep.

Mr. HUNTINGTON. I would like to ask if you are ever troubled with the blast on carrots?

Mr. WARE. Very seldom. Early sowing would be very likely to affect the rows with blast; but sowing so late as the 25th of May, or the 1st of June, it is very rarely that they are so affected. By the way, in my opinion, October is the great month for the growth of roots. I think more than one-half of their growth is attained during the month of October; and if a crop, either of ruta-bagas or carrots, is sown too early in the season, it becomes so mature, and begins so to ripen and harden, and sometimes to send up seed stalks, that when October comes, the very month in which they should make their growth, to insure a rich, tender and juicy root, their game is up, they have nothing more to do. The very best month of the year is of no use to the early sown crop. Therefore I think the time of sowing is particularly important.

There is another thing which I omitted to mention. By sowing late in the season, we gain just about once weeding. I would have the ground ploughed once or twice, and harrowed between the ploughings once or twice, so that the weeds would have a chance to grow two or three crops before the crop is sowed, and we thus get rid of so much weed seed; so much has germinated and is ended. If you sow early, you have got that amount of weeds to contend with. This advantage is a very great point. Mr. Huntington's suggestion in regard to weeding was a very just one. Oftentimes, one day's work at the weeds, at the right time, is worth more than a week's work afterwards, and it is very important to do it just at the right time. If the weeds get large, it is a very great amount of labor to clean the ground. Aside from the damage that too late weeding does to the crop, it saves very much labor to do it just at the right time. We use, in our cultivation, what we call truckle-hoes. One man can do as much or more in a day, and do it very much better, than two men with hoes. You are all, doubtless, acquainted with it. "Scuffle-hoes" some call them, on wheels.

Mr. HUNTINGTON. I would like to inquire in regard to the economy of raising roots for stock feeding. I don't know but the farmers in your section raise their roots for market. I would like to know their opinion in regard to the economy of raising them for stock.

Mr. WARE. We do raise for the market, but we don't neglect our own stock. I have in my cellar now more than thirty tons of roots that I intend to feed out. I have a very small farm, and don't keep a very large stock, although I have quite a stock of horses just now. But we never intend to sell roots to the neglect of our stock. We sell the surplus, but are sure to keep enough to feed our stock through the winter, and feed them liberally. It saves a vast amount of hay. Many of us—I myself for one—have to buy our hay, in part, and the raising of roots reduces my hay bill very much indeed, and stock will appear very much better when fed partly with roots. The idea of a peck of carrots being worth as much as a peck of oats is perfectly absurd. I have heard that idea suggested, especially in parts of the country where carrots are not very much grown. It is better for stock to be fed with carrots, in connection with hay and grain, rather than to be fed entirely with hay and grain. I think a portion of roots for all animals is not only economical, but keeps cattle and horses and all stock in better condition, better health and better heart; and I would never fail to have an ample supply of carrots and other roots, such as I would most desire to feed out through the winter.

Professor CHADBOURNE. What state do you like the tops to be in when you harvest the crop?

Mr. WARE. The carrot tops are usually in a green and growing condition; not, of course, growing so rapidly as they were in October; but I like to have my carrot crop not so far in advance as to have the tops dead or dying. I like to have them green. And, by the way, there is another point in the matter. I rake off my tops, after they are cut, and feed them out to my stock. Every particle is eaten by the cows and horses, so that the whole crop is saved. The tops would always be green and growing at the time of harvesting if sown at the proper time; but if sown early the tops would be of no value, and the bottoms of not much more value, comparatively. I don't think a healthy crop of carrots or ruta-bagas can be raised for winter, sown early in the season.

Mr. HUBBARD. I see the gentleman is master of his subject, and I wish to ask if he is ever troubled with green lice upon turnips?

Mr. WARE. Cabbages and turnips are very liable to become lousy. We had acres in our neighborhood a year ago, in August, that became so offensive from disease, (owing primarily to the drought—but the plants were affected with lice all through the fields,) that the wind coming from them was really troublesome and annoying. But in ordinary seasons the turnip crop would not be liable to that trouble; neither would cabbages, except in a very dry time.

Mr. HUBBARD. I found the same difficulty with my own cabbages and turnips. Almost every cabbage, at a certain season of the year, had these green lice upon it; and the same thing happened to my turnips. As soon as it became wet, the lice disappeared. The cabbage heads formed, but the turnip tops died. Have you any remedy for that?

Mr. WARE. I suppose weak brine would be a remedy, but it is so difficult of application that I should consider it impracticable. These lice are more commonly under the leaf than anywhere, so that it would be almost impossible to apply this remedy; and I don't know of any other that would be practicable. If we have unfavorable weather, we are liable to disappointment in our crops. We depend upon the season very much, and we grope our way in darkness: but still, with a little light. We usually have fair returns, but sometimes meet with disappointments, from unfavorable seasons, that we cannot control, and sometimes lose our crops from such causes. Oftentimes we meet with difficulties which we cannot combat. We know of no practical application that is a remedy, and we pocket the loss in such cases. I have seen no trouble of that kind this year, so that it is very evident that the dry weather was the cause of it.

Mr. SLADE. Is it not economy to raise carrots with onions?

Mr. WARE. I think not. I know that is practised in Bristol County, and in Rhode Island, in many cases. They cultivate onions very differently from what we do. They think their way is the best; we think ours is. I shouldn't think at all of sowing carrots with onions.

In regard to fertilizers, I will say that I have applied flour of bone to onions. Besides the double-hoppered machine that I spoke of for planting seed and fertilizer together, I have another that distributes the fertilizer directly on the row, after the plants have come up, as I thought a little additional nursing just at that time might oftentimes be beneficial. I have applied the flour of bone to onions in both these ways; and in order to experiment with anything, I think it is absolutely necessary to use it on part of a piece of land and cultivate another part without it; and if there is value in the fertilizer applied, you will see it in that way. I have tried this flour of bone on that plan, and I am very sorry to say I have been sadly disappointed, for my hopes were raised very high. I had read the advertisements of the agents of that fertilizer, and had received their books of certificates from men who are practical farmers, men whose authority should stand high, and I used the fertilizer with high expectations, but I must say I have been sadly disappointed. I believe that Peruvian guano is valuable, but when it comes to be valued at $120 a ton by the dealers, I don't believe that any Essex County farmer can afford to buy it. I have used the "ammoniated Pacific guano." This guano, in its natural condition, lacks the ammonia, I understand, and the agent of the company which supply the article, presented me with their book of certificates, and also with a bag of their "ammoniated Pacific guano." They say that the ammonia is added in just exactly the proportions to meet the wants of all sorts of vegetables, and to make the barren field bloom and blossom as the rose. I received that bag of "ammoniated Pacific guano," confidingly, and with high hopes. One of the gentlemen of that firm was present at the time of my application;—and, by the way, he told me it was specially adapted to the turnip crop. At that time, I had sown my crop of turnips, and they were just out of the ground, and he wanted me to apply this fertilizer to the turnips and see what the result would be. I did so. I took him out to show him my method of application. I showed him my little implement, that dropped the guano along directly on the row—each row just such a quantity as I thought necessary, neither more nor less, and I asked him if he thought that was the best way of applying it. "Yes, an admirable way." In the fall, I received a letter from the firm, requesting a statement of the results of my experiment with their "ammoniated Pacific guano" upon the turnip crop. I wrote them, in reply, that I had had a most admirable crop,—that the turnips were large and smooth,—a beautiful crop: but that I had never been able to discover the slightest difference between the crop from the land where the ammoniated guano was put, and that from where it was not put. I looked in vain for my certificate in their book of recommendations! It didn't appear there and I felt slighted!

Mr. OLIVER. Did you ever buy any "true, unadulterated" fertilizer or seed that answered the description of the seller?

Mr. WARE. I have bought seed sometimes that was good and sometimes that was not good. I avoid buying seed as much as possible. I have spent a great deal of money in fertilizers. I have got a good many barrels of flour of bone, Chicago bone, of Gould's muriate of lime, (the biggest humbug of the whole,) in my barn now. I bought them in good faith, I tried them in good faith, and the balance remains there. I hope some day I may find a use for it.

A MEMBER. I would like to inquire your method of growing early potatoes?

Mr. WARE. We plant our early potatoes in drills. We have got a hoeing machine, working with double revolving hoes, which, with the rows just three and a half feet apart, will do the work of hoeing better than it can be done by hand. First going through the rows with another implement, a horse hoe or cultivator, and then with this, it makes the labor of cultivating the potatoes very small indeed. If I were to plant potatoes just as I think the best way, I should furrow out the rows three and a half feet apart, not very deeply—say four or five inches—drop the potatoes about ten inches apart, (we cut the potatoes into pieces, having certainly two eyes on each piece, and if there are three it doesn't matter,) and then cover them with manure; after that the manure, potatoes and all may be covered with the plough, saving a great deal of labor. After that, wait some ten days, until the weeds have just started, little tender, delicate things, and then go lengthwise of your rows with a brush harrow, which will level down the furrows slightly, and just wipe off the top of the ground, destroying the first sprouting of the weeds.

Mr. Huntington. About what time do you plant?

Mr. Ware. Just as early as the land will do to work. That, of course, depends upon the weather. I don't like to stir the land until it will work friable and light. I don't like to have it clammy when I work it.

Professor Chadbourne. Have you noticed any difference between planting potatoes when cut, and waiting some days until they become dry?

Mr. Ware. I cannot say as to that. It is very common with us to leave them several days. In the spring we are very busy, and if we have a rainy day we take hold and cut our seed potatoes; and if they are not put in for a week it is no matter, or if put in the next day, we consider it all the same.

Mr. Huntington. Do you think there is any difference between the sprouting end of the potato and the other end in maturing?

Mr. Ware. I don't know as to that particularly. I think that potatoes that come from the sprouting end are smaller than those that come from the eyes at the other end; but whether the one ripens or matures earlier than the other I cannot say. I have never been particular to avoid the sprouting end or the other end; I plant them both together. Now and then a hill of potatoes, or a plant in a hill, is more forward than the others. I attribute that to a difference in the seed potato. Sometimes they are a little mixed. The very best of the early potatoes I think is the Shebago seedling; and among that seed there is a portion that will ripen earlier, but yields a small crop, and we avoid that in selecting our seed. We go along on the side of the rows and pull out or dig out any plant of that kind and get it out of the way, so as not to have it in the seed the coming year, because it yields a small crop and is therefore objectionable.

Mr. Huntington. It shows a different top?

Mr. Ware. It shows a smaller top.

Professor Agassiz. What is the value of the potato crop, altogether, upon the farm? I ask this question with reference to the historical fact, that hundreds of years ago potatoes were grown nowhere; the whole European civilization had grown up before potatoes were in use in any way. I should like to know what modern times have gained by the introduction of the potato, and by the extent to which it is cultivated. And I ask the question for another reason—because the potato, as an article of food, is so little used in Southern Europe, compared with the use to which it is put among the Anglo-Saxon race. My question looks, therefore, to ascertaining what is the absolute value of the potato crop in all its different aspects; because the answer to that may induce one-half of Europe to cultivate it more than they do. You never see a potato upon a French table.

Mr. WARE. We consider the value of the potato just what money it will bring. We raise it to sell, and we are careful to have it in the market when it will bring the most money. If it were not for selling potatoes, I should not think of raising a potato crop to feed it to stock. I should be careful to raise enough for my own use; but for stock I should raise other root crops.

Mr. DODGE. To what extent do you and the Marblehead farmers use kelp in the cultivation of roots?

Mr. WARE. We collect large quantities of kelp—get all we can. We spare no pains to save all we can get, and commonly use it in composting. It is one of the most valuable manures to add to the compost heap that I know of. Take, for instance, meadow mud. The way I make my heaps, I put at the bottom a foot or fifteen inches of meadow mud; then about as much kelp; then a layer of mud, about the same, and then a layer of kelp, and so on, until I get my heap five or six feet high—as high as is convenient. The kelp will generate heat in the coldest weather in winter. In our kelp heaps, when we haul them up in the middle of winter, we find maggots and flies at all times. This kelp, put up in the compost heap, as I have said, will produce heat, and work upon that meadow mud through the winter; and in the spring, pitch it over twice, certainly, before using, and the mass is a valuable manure; equal in value, I think, cord per cord, to stable manure. That is the most profitable way of using kelp, in my opinion, though we oftentimes use it clear. I have seen as handsome potatoes as I ever saw in my life, growing from kelp taken directly from the beach, late in the season, and put right into the ground. It is long and coarse, and very difficult to cover at that time. I have planted potatoes upon it green, and have had a most excellent crop; and always, in such cases, the potatoes are of excellent quality. We use this kelp for all our crops; for our root crops and onion crops. By the way, it is very excellent manure for onions, and especially for cabbages. I think our Marblehead cabbage, which is somewhat well-known, depends more upon kelp than any other one thing. To be sure, we make somewhat of a specialty of it. We have been very careful in selecting seed, so that we have a very choice kind. We have cabbages that are almost sure to head—there are very few exceptions: and they will grow, sometimes, if we will let them, a head of sixty pounds upon one stalk. But we avoid raising such cabbages, if possible, because it is so difficult teaming them to Boston! (Laughter.) We raise them occasionally, to exhibit at our Essex County shows, and the Fairs of the Massachusetts Horticultural Society, but we don't like to; we had rather raise smaller ones, weighing perhaps fifteen pounds. And, by the way, the cabbage crop is a very valuable crop oftentimes. I know of a single instance in our town, which occurred last year, where upon one acre of reclaimed meadow land, which a few years ago was of no sort of practical use, $725 worth of cabbages were raised, at a cost of $125, leaving a net income of $600 from one acre of land, in one year.

A MEMBER. Does this kelp ever come adulterated?

MR. WARE. Oh, yes; but we don't mind the adulterations which the good Father in heaven places in our manure.

MR. HUNTINGTON. What manure do you think is best for early potatoes?

MR. WARE. I should prefer some warm stable manure in connection with kelp; but our manures are usually composted. We make our compost of meadow mud and sea-manure—kelp; and when I say kelp, I mean all the various sea mosses. Just such mosses as you will see beautiful specimens of in the books that the ladies have upon their centre-tables we haul upon our farms by the cart-load; we mix them with meadow mud, and they work together. We make our compost heaps of meadow mud and sea-manure, of stable manure and night-soil; and when I say stable manure, I include cow manure and pig manure. We make somewhat of a speciality of the raising of squashes, and we use night-soil more especially for our squash crop, and use it in connection with other manures for other crops, as it may happen.

Mr. Hubbard. Is not this kelp one of the secrets of your success? Those of us who live at a distance from the shore cannot get that kelp.

Mr. Ware. Very sorry for it, sir. It is a great advantage, certainly. It is an advantage we appreciate fully; and if others cannot get it, we can't help that.

Mr. Harrington, of Lexington. Have you ever used salt hay for potatoes?

Mr. Ware. I have never used salt hay, because we don't have it in our immediate vicinity, except what we buy for stock. We always buy a portion of salt hay for our stock, because it gives them a relish and makes them feed better.

Mr. Harrington. With us it has been found profitable to team it ten or twelve miles for the potato crop.

Mr. Ware. I think that salt is a very valuable manure. I would rather have it than a good many of the popular phosphates and sulphates that sell for three or four cents a pound.

A Member. I understood you to say you would not raise potatoes for stock. Do you mean any kind of stock?

Mr. Ware. I mean in preference to other roots. I would raise other roots because I can get so much larger crops and so much more income from an acre than from potatoes.

Mr. Huntington. Suppose you wanted to raise milk, would you prefer two quarts of potatoes to six quarts of carrots?

Mr. Ware. No, sir.

Mr. Huntington. Did you ever try the experiment?

Mr. Ware. I can't say exactly as to that point. It is simply my own personal opinion. I have no exact knowledge upon that point. I know that potatoes make very poor milk.

Mr. Dodge. Have you had any experience in planting cabbages to kill twitch-grass?

Mr. Ware. Yes, sir. We in Marblehead don't care anything about twitch-grass. Twitch-grass will grow anywhere; but it is most abundant where salt manure or salt has been used. It seems to be in some way or other connected with it. It is not uncommon for our old grass fields to have the twitch-grass work in so as to make a complete sod. But we don't care one pin about it. It is one of the easiest things to manage that

I know of. The sod will become so filled with the roots of it that I think it becomes a valuable manure. My plan for destroying it would be to break up the land after haying, in August—that would be in warm weather, usually—and the next spring I should put upon it either a crop of squashes or cabbages. Both crops are planted late, so that there would be ample time to plough up the sod, which would have got well rotted. I would plough it and cross-plough it when I break it up, which would leave the land in a very rough condition ; but, as I have said, there will be time enough to plough it twice before you put in your crop of either cabbages or squashes, and by that time most of the twitch-grass is dead. If there is any left, we calculate to have our land in such a condition that the crop of squashes or cabbages will cover the whole ground, and the twitch grass cannot grow, for it will be shaded completely and choked to death. It is a very easy matter, therefore, to manage twitch-grass.

Mr. PERKINS. I would inquire in regard to the size of the potatoes you plant ?

Mr. WARE. I prefer a medium size. I tried, a few years, planting small potatoes ; but I think the tendency is to cause the seed to degenerate somewhat. We very frequently buy our seed potatoes, because potatoes grown continuously in one location quite a number of years do not usually yield so well. Therefore we buy the seed from the East, and buying the seed, we take it as it comes, being careful to buy pure seed, and plant the potatoes, whether large or medium or small. There are usually not many small ones come. We cut them according to their size, leaving about two eyes on a piece.

Mr. PERKINS. I would like to call your attention to Mr. Stockbridge's question—whether you see any difference in the crops that follow the various roots ?

Mr. WARE. I think carrots leave the ground in a better condition for other crops than any other crop. A crop of turnips or mangold wurzels does not leave the ground in so favorable condition for other crops, and so with cabbages. Carrots, by way of a cross, will follow a cabbage crop admirably ; but I should think it quite objectionable to follow mangold wurzels, cabbages or turnips with carrots. I should never think of planting cabbages or turnips or mangold wurzels two years in succession on the same ground; but I would not hesitate to plant carrots twice on the same ground in successive years, if it seemed more convenient. The harvesting of carrots with the subsoil plough leaves the land in a very light, fine condition, and is the very best possible preparation that can be made for an onion crop the next year. In fact, I think it is almost useless to attempt to get an onion crop until I have first raised a carrot crop on the same land. That is our usual custom.

Mr. CLARK, of Waltham. Don't you raise onions upon the same land several years in succession?

Mr. WARE. Yes, sir; any length of time. Onions grown upon the same land continuously acquire a more delicate flavor and finer grain, and will ripen earlier and handsomer. Perhaps the crop may not be so bulky, although there won't be much difference, but the quality will be very much better. We expect the first crop of onions to be of coarse fibre, unless they follow carrots.

Mr. STOCKBRIDGE. I wish to ask a question in relation to fertilizers. Your experience in the application of phosphates has been anything but satisfactory. The question I would like to ask is this: whether any applications of these fertilizers, phosphates, especially, have been made to land, to save manure, where you have put six or eight cords to the acre, and the land in a poor condition?

Mr. WARE. I never have risked a crop with phosphates alone. I have had high hopes of aid from them. My idea was that they would be a valuable assistance in starting the crop, but I have depended upon the quantity of manure for the final growth. You asked me, I believe, if I had ever been satisfied with the result of using any fertilizer. I was, once. There was a firm in New York, who manufactured "Mapes's Phosphate of Lime"—I don't know but Professor Mapes manufactured it himself at that time. I had about two quarts sent me in a paper bag, as a present, to try. I tried it, and found the result admirable. I bought about a hundred weight or so, and didn't find the results so favorable. The most satisfactory result I ever got from them was from that little paper bag.

Mr. JOHNSON, of Framingham. I would like to inquire how many bushels of carrots you obtain from an acre, as an average crop?

Mr. Ware. From ten to fifteen hundred bushels, I should say, is a fair, good crop of carrots.

Mr. Perkins. Can you tell us what it costs for labor to raise a bushel of carrots, beets, turnips and potatoes?

Mr. Ware. I cannot answer that question, from the fact of our business being so mixed. We have various crops of roots, and perhaps the hands would be occupied half a day in weeding one kind, and part of the day in weeding another, and so on. And perhaps if the men had an hour or two to spare, when they were about something else, they would be set to truckle-hoeing. The business of market gardening is so mixed up, generally, that unless a person made a specialty of it, it would be very difficult for him to tell the exact cost of the production of any one crop.

Mr. Slade. Can you tell us the price of labor, and the number of hours the laborers work a day?

Mr. Ware. This last year, we paid $20 a month for eight months, and boarded the men. The men rise in the morning about five o'clock, do up what we call the chores about the barn, take care of the cattle, eat their breakfast, and go to their work; at nine o'clock, come in to luncheon; at twelve, to dinner, and then they have some other chores, and leave off work at night so as to get through with their chores and everything about sundown; before sundown, in the longest days. In the winter, of course, the hours of labor are very much less. In a vegetable garden, perhaps the largest amount of labor is the weeding. We usually hire men enough to do all the spring work, put in the crops, and do the hoeing, and hire boys by the day, to do the weeding. A boy twelve years old, who is used to it, can weed full as much in a day as a man, and perhaps to better advantage; and we employ a good deal of such labor, and pay them pretty good prices, too. We pay boys seventy-five cents a day, and they don't go to work so early nor work quite so late as the men do. We used to pay boys twenty-five cents a day, where we now pay seventy-five.

Mr. Clement. Are you ever troubled with the cut-worm among your vegetables?

Mr. Ware. The cut-worm is troublesome, but very seldom sufficiently so to destroy a crop, and if we meet with any accident of that kind, we fill up the vacant space, by setting out cabbage plants. We can set them out late in the season, and fill up any vacancies. It is very seldom we have a crop destroyed by the cut-worm. They do come up and eat the cabbages at the buts, but then we have always surplus plants, and if we lose one, we put in another, and so secure a crop.

Mr. CLEMENT. Did you ever imagine that the use of salt manure was beneficial in destroying them, or preventing their ravages?

Mr. WARE. No, sir; I don't think there is salt enough in salt manure to have that effect. I shouldn't think it had any effect in that way, because I have known pieces entirely cut off by them, but not often.

Mr. CLEMENT. Then I would ask if you think autumn ploughing is beneficial in the destruction of the larvæ?

Mr. WARE. I think it is. I think it disturbs their arrangements for the winter in such a way that they are not prepared for the cold weather. I think that is one of the great advantages of fall ploughing—that it destroys insects. I would avoid fall ploughing on hillsides, where the rains are liable to wash the soil away. It is not uncommon in the winter time, after the ground is frozen on the surface of a hill, for the wind to blow off any top dust that there may be; and to avoid this blowing away of the surface soil as much as possible, we drag it down smooth. Instead of a roller, we use a drag in our vicinity very much.

Mr. PERKINS. What do you call a drag?

Mr. WARE. The general idea of a drag is something to haul rocks upon. We make one on purpose for this business. We take three plank, about eight feet long, and have the inner side of it bevelling a little; nail on some cross-pieces, with one side a little bevelling,—something like a sleigh runner, only not so much,—and then we have a chain attached to each end, hitch a team to the chain, and a man rides on the drag to drive, and has a very nice time. That is the way we smooth off our land after laying down to grass. It leaves the land very smooth, and in fine order. If there is a stone, it will crowd it down; if there is a lump of dirt, it will grind it up, instead of pressing it down, as a roller will. We think, therefore, the drag is much better. The flat part I should have about two feet wide, and the bevelled part need not be more than ten inches—just a slight bevel, so as to rise from the ground; making the whole width about three feet.

Mr. Perkins. And your drag is so hauled that it makes a track of eight feet?

Mr. Ware. Yes, sir.

Mr. Dodge. Is this a new idea in Marblehead, or have you never had rollers there?

Mr. Ware. We have had rollers, but this is, perhaps, a local arrangement. It is customary with all the farmers in our neighborhood to use a drag, not a roller. It is very much less expensive, takes up less room, and does the work a great deal better. We don't care to have it at much of an angle; we simply want it to slide over the surface of the ground; and if it was exactly square, the front edges would be digging into the ground. The driver, by placing himself in the middle or back of the drag, can regulate that himself.

Mr. Flint. Have you made any experiments with regard to the following of the ruta-baga with other crops?

I have in my mind a very successful farmer, and a very observing man, in Westborough, who planted a piece of half an acre with ruta-bagas, and the following year he had occasion to plant that piece with corn, and also some adjoining land; and the crop on the part where the ruta-bagas were planted was so inferior to that where they were not planted, but where some other crop had been raised, that the difference was perceptible through the whole season. The line was as distinct as it could be, and so marked that no one could help noticing it. It was evident to everybody that the want of success with the corn was owing to the turnips on the land the year before. This shows that there was some deleterious effect upon the land, caused by the culture of the ruta-bagas; and I find that that opinion is very prevalent among our most observing farmers. I have heard it expressed in a vast number of instances.

Now, my question is, whether Mr. Ware has ever made any experiments, so as to be able to say distinctly whether that is a fact or not?

Mr. Ware. I have seen results. I have not in my mind experiments that I can state exactly, but I have seen results, and they were of such a character that I avoid raising ruta-bagas. I think their effect upon the land is very injurious, and if I were going to put in a crop of roots after a crop of ruta-bagas, and thought that six cords of manure would be sufficient if following a crop of carrots, I should be very certain to put in eight. I think that, for succeeding crops, ruta-bagas are very much more injurious than other root crops.

Mr. Flint. Suppose you wanted to lay a piece down to grass, what would be the effect?

Mr. Ware. I have no experience in that way; but I know that if a piece of land is laid down after cabbages, which are of the same character as the turnip, it succeeds admirably.

Mr. Hubbard. I had a little experience in that line, in raising late cabbages and turnips on a field which contained 132 rods. It was highly manured for a good cabbage and turnip crop, and the next year I put on wheat; and on those 132 rods of ground I had twenty-four and one-half bushels of very handsome spring wheat; and I never perceived any difference between the turnip and cabbage part of the field. At any rate, the crop of wheat was rather extra upon that amount of ground.

Mr. Ware. Did any part of your field of wheat extend beyond these 132 rods?

Mr. Hubbard. Yes, sir.

Mr. Ware. Allow me to ask if that piece where the cabbages and turnips were grown had been more heavily manured than the other part of the field where the wheat was?

Mr. Hubbard. I was only speaking of this part that contained the cabbages and turnips, where the land was measured. The wheat was the largest and best where the cabbages and turnips were, and I attributed it to the manure.

Mr. Smith, of Sunderland. I should like to ask about the proper time of sowing mangolds and beets?

Mr. Ware. Mangolds I should sow as late as carrots, and also beets, if raised for stock; but I do not raise beets for stock. What beets I raise are for the early market, usually, and sometimes show beets. Beets for winter family use should be sown as late as from the twenty-fifth of May to the first of June, in order to be tender, sweet roots. We don't use beets for stock; we use mangolds and carrots in preference.

Mr. Clement. I wish to ask now, whether you have any particular method of keeping seeds, or ever have occasion to keep them more than a year—carrot seeds, for instance?

Mr. Ware. In cleaning seed, we sink it, in order to have it very pure. Seed that has been sunk, I should be afraid to plant the second year, although, if proper care is taken in drying, it might be saved; but ordinarily, I should avoid sinking the seed for more than the present year's planting. Without sinking, I think the carrot seed is very good the second year; a little risky the third. Onion seed, I should say about the same. If not sunk, very good the second year; the third, I should be suspicious of it. Turnip seed, not good after the second year. Mangold wurzel will last quite a number of years. Cabbage, four, five, perhaps six years, provided it is well cared for.

Mr. Hubbard. How is the cleaning of the seed done?

Mr. Ware. I think I know how to clean carrot seed, and perhaps it may be interesting to you all to know. I labored very hard in cleaning it before I knew how. I think the proper way is, after it is harvested and put away to dry, to select some very clear day in winter, when the thermometer is down to zero or below, and spread it on the floor, on a piece of coarse canvas, and thrash it with the flail until you get tired; then turn it over and thrash it again, and it will become very fine. Carrot seed has a little fibre on it, which we want to get rid of, because we cannot sow it so readily if those fibres are on it. In pounding the seed in this way, in cold weather, all these little fibres will come off, or, if there are some that have not come off, a very good finish to it is to take a board and press it, pushing a little at the same time. It will sort of grind upon itself, and grind off all these little fibres that still remain on the seed. Then you have small portions of the stalk that the seed grew on, the dust of these little hairy fibres that grew on the seed, good sound solid seed, and light seed, that is not good. I think the life of a little plant depends in a great measure upon the amount of nutrition there is in the seed itself; therefore, a large, plump seed, will make a very much stronger plant than a weak seed, that will only just germinate. We don't want to plant any of this seed that will barely germinate and make a plant; we don't call that good seed. We want to separate the large, plump, heavy seed from this light seed, so we put it all into a tub, fill the tub with water, and stir it up some little time, but not too long, for if you do, you will get some seed that you ought not to have. The solid seed will readily sink, the light seed will float; skim it off and throw it away. You will feel that you are wasting a large portion of your seed, but it is very poor economy to sow such seed. Then pour off the water, and with it will be poured off all the fine dust that has collected by cleaning the seed; and by filling up and pouring off two or three times you will have your seed just as fair and clean as possible. Your seed will be free from the fibre that grew upon it, and it will not be much more than half the circumference that it was before; but you have got a clean article, and you can regulate your machine to sow such seed just exactly as you want to, and get just as much seed in a given space as you desire.

Mr. SLADE. How many do you calculate to drop in a hill?

Mr. WARE. We don't drop any in hills, we sow in drills. The wheel of my machine is two and a half or three feet in diameter, and in one revolution of that wheel, for carrots, I would drop from 96 to 120 seeds. You can tell just exactly how many seeds you are putting in a certain space. I would like to have a plant as often as once in an inch, but you cannot have the machine distribute the seed just exactly so. Sometimes there will be two or three seeds within a half inch, then there may be two inches without any, but if it average about a seed to an inch, that is what you want. You can easily tell how many your machine is casting by turning it one revolution, and catching the seed in a pan and counting them; then, knowing how many inches there are in the circumference of your wheel, you know just how many seeds you are planting to the foot. In that way, you can so regulate your machine as to plant just the quantity you want, and save the expense of thinning, which, as I said before, is a very laborious and tedious process. It is just so with onions.

Mr. HUBBARD. I hope the gentleman will not get weary. We like to pump from a well that we cannot pump dry. I would like to inquire whether, in saving your seed, you have any reference to the centre stalk?

Mr. WARE. No, sir. The centre stalk has altogether the best seed, but there will be some side branches, and those side branches will have centre stalks, too. We save the main centre stalk and the centre stalk of the side branches; but the smaller heads we never gather at all, because they are just so much chaff to be got rid of.

Mr. Hubbard. In saving cabbage seed, would you have any reference to saving the seed from the centre stalk rather than from the branches?

Mr. Ware. I think that whether a cabbage sends up one stalk or more is rather accidental than otherwise. The cabbage, in sending out a seed stalk, has to burst through the head. Sometimes, when that sprout is coming out, it meets with obstructions and will divide. It is sometimes very difficult to get out, and therefore I generally cut a little slit across the head of the cabbage to facilitate the getting out of a sprout. The natural tendency is to throw up one sprout; but if that one sprout meets with serious obstacles in coming out, it may come out in two or three. I think the stronger the stalk or shoot that comes up, the better would be the seed; and I know that the vigor and life of the cabbage depend very much indeed upon the vigor of the seed. A large, thrifty, well-rounded cabbage seed will produce a plant as different from a little shrivelled up cabbage seed as you can imagine. There is as much difference in the appearance of the plants when they come up as there is between the two seeds themselves, and that is immense.

Mr. Huntington. How do you dry them after washing?

Mr. Ware. I should sink them on a dry day, then spread the seed out thin on a cloth and lay it on a platform or board, and by turning it two or three times you will get it dry enough in a day so that it may be taken in. But don't put it away in that condition; it wants to be open to the air for several days. It takes a good while to get thoroughly dried. But don't dry it near a stove. If, however, you want to use it immediately, the seed cleaned to-day would be ready to sow to-morrow.

Mr. Perkins. What distance apart are the rows of your carrots?

Mr. Ware. Fifteen inches.

Mr. Perkins. What distance apart are the carrots?

Mr. Ware. If I could have them just exactly as I wanted them, I would have them one inch apart; but in getting them to average that you may have two or three in one inch and none in another. If sowed properly, I should not thin them at all; for there is this feature about carrots, if they are too close they will crowd each other, and work themselves into position, and come out all right. It won't do, if you have two or three in one place, to thin them out to one plant—you will get them too thin on the average. You want to get the average right.

Mr. SMITH. Do you thin onions at all?

Mr. WARE. We sow them so that they will average about right—about an inch. Onions have a faculty of riding each other. I have seen a row of onions that made quite a pile; of course the centre onions would not be within four inches of the ground.

Mr. PERKINS. What distance apart do you put your rows of mangolds?

Mr. WARE. Twenty-two inches apart, and cultivate between them with those truckle-hoes. I suppose it might be advisable to have them far enough apart to go between with a horse-hoe—three feet or a little more. In that case the roots would grow somewhat larger. I am not certain but the crop would be as good, but my practice has been to sow them twenty-two inches apart, and work between them with the truckle-hoe, and thin the plants at the second weeding. If you thin too soon, these cut-worms are very apt to come up and take the ones you have left; but wait until they have got so strong that the cut-worm will not trouble them, and then leave them about eight inches apart.

Mr. PERKINS. What variety of mangold do you cultivate?

Mr. WARE. The orange globe mangold, and the red also. I thought at one time that I should give the preference to the orange globe, and I think it will make a better root and keep better, but I am inclined to doubt whether the red will not make a larger growth. The orange is a little more solid root, makes a good growth, and keeps rather better. Therefore I am inclined to favor that.

Mr. THOMPSON, of Nantucket. I desire to say a word or two in regard to these fertilizers. I began to raise roots this season, and I wished to test the value of different manures and these specific fertilizers. I took a piece of land that had not been manured for some five or six years,—rather sandy land, with clay underlying. I divided that into sections of eight paces across the piece, and ploughed it, without any manure. Then I took sheep manure and spread it on half of one of these sections at the rate of twenty loads to the acre, of twenty bushels each. These sections were about five rods across. Then, after ploughing, and when I got ready to plant, I applied the sheep manure to the other half of that section, so that I should be able to test the value of it ploughed under, and also applied to the land after it was ploughed and previous to planting, cultivating under with a horse-hoe. The next section was guano—this "ammoniated Pacific guano" at the rate of 200 pounds to the acre, composted with red loam. To the next section I applied flour of bone, at the rate of about 300 pounds to the acre. That I applied without composting it; had it sowed close down, and its quantity weighed out in proportion to the amount of land it was to cover. So I went on through the piece, alternately applying the guano and the flour of bone, until about the fourth or fifth section, which I left without applying anything to it at all. Then, on the 4th day of July, that was planted with what we call Italian turnips, a species of French turnip, the seeds of which were imported a number of years ago, and have been constantly cultivated with us since, as preferable to any French turnip for table use. The whole piece was more or less injured by a worm, which is as large as the army worm, (and really they were almost as troublesome this year,) with yellowish stripes longitudinally, and probably three-sixteenths of an inch in diameter, and the drought was somewhat severe upon the crop when it was growing. The result was a marked difference in favor of the ammoniated guano. The sheep manure that was applied and turned under at the first ploughing was about equal to the guano; that which was cultivated in was of no advantage at all perceptibly, but I think that unfavorable result was caused by the drought; if it had been a rainy season, it might have resulted in greater advantage. I could see no advantage from the flour of bone over the section that had no manure of any kind upon it. That was my experiment with the turnips.

The land adjoining that piece was ploughed and manure turned in at the rate of twenty loads to the acre, of twenty bushels each, and planted with corn, without manure in the hill, except two rows. In those two rows, there was a tablespoonful of the ammoniated guano dropped into each hill, after the seed was planted; not allowing it to lie upon the seed, but upon the side of the hill, where it would be covered by the hoe, and be mixed with the earth. The effect of that was so marked that you could see it before you got to the land, and the crop was better. All our corn was somewhat cut off by the drought this year, but those two rows were preferable to any of the others. I applied the flour of bone to two rows at the first hoeing, and the guano also to two rows. The effect of the application of the guano at the hoeing was not so great as at the planting; the flour of bone made no perceptible difference at all, at any time. I never have seen any particular advantage from it. Whether or not it will come in the next crop, I cannot say.

I wish to state in regard to a crop of mangolds that I raised, and my opinion of their value, from a test that I made last year. I will say, that all these tests and experiments that we make are not so accurate as they would be if we went to work and weighed exactly, pound for pound, what we fed out to stock, and the result in the product of milk; but last winter I fed carrots to three cows for two weeks, at the rate of a peck apiece a day, with fine feed, a quart to the peck, and then I kept the run of the quantity of milk. Then I tried the long red mangolds for two weeks, with the same amount of fine feed, and kept the run of the milk. As near as I could judge, in this rough way of testing, the result was about twenty per cent. in favor of the carrots. The amount of hay was not weighed to the cattle at the time, but I thought, from as close observation as I could make by looking over the stack every day, it seemed to me to be decidedly in favor of the carrots.

In raising carrots this year upon the same quality of land, that had been manured for two years, I ploughed in coarse manure right from the barn-yard, about six inches deep, upon land that was fully permeated with twitch-grass, or dog-grass, as we call it; I think Mr. Flint's book gives it as *Triticum repens.* I had that ploughed in, and then, before planting, I had twenty loads more to the acre applied, that had lain a year, to be cultivated in before planting the roots; for my experience is, that unless the manure that you apply to plant roots upon is well decomposed, they will straggle, instead of going down straight and smooth, will run to tops, and the roots will not be so long as they would be if planted upon well rotted manure. I found the carrots gave about seven bushels to the rod. I took from a quarter of an acre 275 bushels of long reds, and I think if I had planted the rows three feet apart instead of two, I should have taken a greater bulk. The outside row was evidently over a hundred per cent. more bulky than the next row inward.

Then I wished to test the value of thinning the carrots. Some of my neighbors said, "Don't thin carrots," and some said, "Thin carrots." I was positive which was the best way in regard to beets, and now I wished to test which judgment was best in regard to carrots. I had a truckle-hoe, but there is a ledge or rail that runs each way from the blade of the truckle-hoe, which, if it is run through the rows after the little sprouts are up on top of the ground, will cover them up; therefore I think it best to run through first with the common hoe, until the plants have got so large that they will protect themselves, and will not be covered up with the sand or earth from the truckle-hoe. Then I have a hoe four inches wide, and hoe across the piece, which will leave four plants in a column and four inches between the columns. That is the way I thinned them out. But four rows were left not thinned at all. The men dug these and measured them into the wagon. There were ten baskets full of small roots. The next four rows, there were twelve baskets full of good, stout, healthy roots; which satisfied me that I ought to thin rather than leave them not thinned.

My appreciation of the value of roots in feeding is to this degree. I always give my horse more or less roots, and I think if I had two tons and a half of hay for a full-sized cow, I would sell twenty per cent. of the hay and purchase with the money all the roots I could, and feed them in addition to the other eighty per cent. of hay, and my cow would give me more milk, and come out in better condition in the spring.

Mr. Slade. In the early part of this discussion Mr. Huntington remarked that he had become almost discouraged in regard to raising French turnips. Mr. Ware has thrown some light upon the subject, and I just wish to add that it accords with my experience. I have for several years found that when I planted my turnips and mangolds early—which, by the way, we all want to do—we want to get them in and out of the way before we go to haying, and hoe them once, perhaps, if we can;

consequently we have been in the habit of putting them in about the 20th of June—from the 18th to the 24th. I say I have found that when I have planted my mangolds thus early, there have been more or less rotten turnips at harvest time. But we have no rotten turnips when we plant late. This year my turnips were grown on three separate pieces. The first piece was planted the 20th of June, and out of about 500 bushels, about 80 bushels were rotten. Another piece of turnips was planted the 7th day of July, where we had picked our strawberries—or rather where the strawberries should have been—the crop wasn't much. We turned the piece in the 7th day of July, used some crushed bone for dressing, and raised a handsome crop of French turnips—not a rotten one in the whole. On another piece, planted, I think, the 9th day of July, which was an old strawberry bed, turned in, and some strippings of the barn-yard put on it, the crop was good, the quality excellent, and there was not a sign of any rot. These facts accord with the experience of my neighbors in this matter; and, in fact, it is very well understood with us, that if we wish to get a good crop of turnips we must not plant them until late. The fact is, people generally who raise root crops are too anxious to plant them early and to harvest them early. There comes a cold night in the fall, and they begin to think, "Here are my crops out, and I must get them in." It is not time to get them in. They will stand it a long while after we think it is time to take them in. There is a gentleman in my neighborhood who had a fine piece of turnips, which he did not commence harvesting until the day after Thanksgiving; I finished the 10th of November. He says we are in too much of a hurry to get our roots into the cellar.

In regard to the crops to follow French turnips and ruta-bagas, my experience agrees with Mr. Flint's statement. I cannot raise corn or strawberries after them, and I never succeeded to my satisfaction in raising grass after them. The best thing I ever raised after a crop of French turnips or ruta-bagas was a similar crop. Put on manure and plant them again, as you would onions. I have a piece of about five-eighths of an acre, which was manured from the barn-yard last year, perhaps twenty horse-loads to the acre, and we raised 400 bushels on it. This year I put on about twelve horse-loads of rather weak compost and eighty bushels of ashes; the rows were planted twenty-eight inches apart, and the crop was about 500 bushels. It wasn't very accurately measured, but we had no doubt that it was about that. I don't think the crop cost to exceed ten cents a bushel, provided the land is in as good condition as it was before the crop was raised on it.

Professor AGASSIZ. May I be permitted to return once more to my question, for I was, perhaps, not understood? I wanted to obtain some information with reference to the nutritive properties of turnips, beets, carrots and like roots, as compared with potatoes. In the one case we eat or feed essentially starch; in the other we eat or feed essentially sugar. Now the question is, what is the respective value of these crops—the potato on one side, a farinaceous tubercle, and the sugar roots on the other—with reference to agricultural economy?

Mr. HARRINGTON. I am very glad Professor Agassiz has asked the question. It has been revolved in my mind very seriously whether the farmers of Massachusetts are proceeding in the best course to arrive at the best result in regard to profit. That is what we should all aim at—profit and the improvement of the farm. I would ask the question, whether it is not a fact that, taking the whole of Massachusetts, good hay is the best crop for your stock, for market and for beef?

Mr. PUTNAM, of Danvers. This question is important to us all as farmers. I may differ somewhat from the remarks that have been made here this forenoon. The question before the Board is, I suppose, what is the best crop to raise to support our domestic animals? We have had the experience of Mr. Ware in a particular locality—in Marblehead—with roots. I should take the ground that we have another crop which is more advantageous for feeding to domestic animals than roots, and that is Indian corn. My experience is, that I can raise one hundred bushels of Indian corn where I can raise one thousand bushels of roots. Some few years ago the Board published a statement saying that Indian meal was the most nutritive and best addition that could be made to English hay for the production of milk. Now the Board seems rather tending to the encouragement of the growing of roots than directing the attention of farmers to Indian corn, which they have shown by experiments made at Westborough, if I recollect right, is the most profitable crop for producing milk. Now I wish to turn the attention of the Board more particularly to this question.

Mr. Ware is peculiarly situated for raising roots, because he gets a very large amount of his manure from the sea, which those of us who are inland cannot get. I have formerly raised roots, and put a thousand bushels or more of them into my cellar ; and when I have had to bring them up myself in winter, and feed them out, I have asked myself the question whether I could not get along more easily by raising corn and feeding it to my cows. It is a very easy thing to get a thousand bushels into your cellar ; but it is some work, in a cold morning, to bring them up, chop them, and feed them to the cows. Then another thing. In turning our attention to roots, we have to guard against excessive cold. A carrot, after it has been chilled or frozen, is not healthy food for cows or any other animals. I know cows in Danvers that have been made sick by eating carrots that have been frozen. There is no such trouble with Indian corn. That is the crop adapted to us. God has given us this plant for our use. Agricultural writers have told us much about English farmers. Their climate is milder than ours, and roots may be adapted to their winters ; but here, in our severe, cold climate, we have got to provide some animal heat for our cows, and we have in our Indian corn just what our animals need for this excessive cold weather. That is following nature. And if we can grow corn, there is no difficulty about keeping it. If we do not want it the first year we are sure to want it the next ; but most of us use it all up the first year. Then, in connection with the corn itself, the amount of fodder that is grown upon an acre is to be considered. I think that, if you allow sixty bushels of corn to the acre, and six hundred bushels of roots, which would be a good crop, take the State through, the growing of Indian corn should be encouraged rather than the growing of roots. I do not confine myself to some particular localities, where they have an excess of manure, aside from the farm, but include the whole State, where, as a general thing, the farmers are dependent upon their own resources for manure to keep the land in good order.

Mr. Slade. The most expeditious way of raising corn, after all, is to raise roots. A thousand bushels of roots, which can be raised as easily as a hundred bushels of corn, will buy three or four hundred bushels of corn. That is the reason I do not raise any grain. I cannot afford it. I raised none this year of any kind; but a little less than a third of an acre of mangolds, sold for enough to buy a hundred bushels of corn; and I had enough French turnips from the five-eighths of an acre that I spoke of to buy two hundred and fifty bushels of corn. Those French turnips cost ten cents a bushel; and, as I said before, that is the most economical way of raising corn that I know of. That is what we do in Bristol. We sell all our carrots, and buy corn.

Dr. Loring. I desire to say one word in reply to Professor Agassiz. His question relates to the position which the potato holds in agricultural economy. It has passed out of the economy of large farming in New England. That is, wherever farming is carried on with any degree of profit, the potato is not considered a root that can enter into that business. Something—the effect of the climate or soil, or the limited time the root has to run,—has already stricken it out of those products which belong to the great economy of the farm. The same cultivation that will produce a thousand bushels of good sound purple-top Swedish turnip, the great turnip of England, the ruta-baga, Skirving's King of the Swedes, would not probably produce two hundred bushels of potatoes. In past times, when the potato did enter into the economy of the farm, and was thought to be a crop that the farmer could raise, it was a crop of five or six hundred bushels of the coarse long-red potato, not remarkably nutritious for either men or animals; so that the potato crop really should be classed with the primitive and ruder modes of farming.

With regard to the comparative value of the potato and other roots, the potato does not come into the scale in that respect either. There is not so much nourishment in a bushel of long-red potatoes as there is in a bushel of the turnips that I have just spoken of, for feeding to stock. There is no question about that; analysis shows it; experience shows it. Whether it is the starch in the potato, or the sugar in the mangold, or what it is, it is impossible to tell; but there is no doubt about this fact.

Now, I wish to say a few words on what I conceive to be the general subject. The raising of root crops has been a study of mine for years. I satisfied my mind, in the first place, that the business of farming, properly conducted, involved the raising of roots, and I have listened with extreme interest to Mr. Ware's details with regard to the management of roots on his own piece of land, where he works with good results. I want to distinguish between roots, in the first place. Mr. Ware has made certain general declarations, which I do not exactly agree with—not that I call in question the value of his experience. Now, in regard to mangolds. They will grow on heavy, strong, clayey lands; that is the place for them. It is not necessary to enlarge upon that. They will not grow upon light land profitably. Swedish turnips will not grow upon heavy, rich clay lands; you cannot raise a smooth solid turnip there, and get a good crop. They want a light soil, filled with mineral material. Carrots want a warm, light soil, well cultivated. The drag, as Mr. Ware says, is the thing for root crops. Do not imagine that the drag is a substitute for the roller. You cultivate one thing with the drag, and another thing with the roller; and that Mr. Ware would have said, if he had thought of it. He would use his drag upon land where he had sown carrots; he would not use it upon land where he had sown grass or grain.

Mr. Ware. Our practise is to use the drag and not the roller in all cases for grain as well as roots.

Dr. Loring. The best grass and grain fields that I have ever seen have been sowed, the seed harrowed in, and rolled frequently.

These lands of which I have spoken are the lands that will carry certain specific roots, and carry them well. There is no trouble about it. The lands I have designated, applied to the roots I have designated, will always carry them well.

The land for carrots and for mangolds should be ploughed as early as possible. The mangolds I would sow as early as possible. In regard to carrots, I think Mr. Ware is perfectly right. The land for turnips must be ploughed late; for late turnips are turnips; it is useless to talk about early turnips.

Now with regard to manures. For mangolds the land should be drilled, and manure put in the drill. You can use green manure just as well as decomposed manure. Green manure from the barn-yard, properly mixed, with a little salt—because a little salt always comes in well on such land as can grow mangolds—should be put in the drills. That is the best way a crop of mangolds can be raised. Salt for mangolds. I have used forty bushels of fine salt to the acre, composted with manure. That, put into the drills, will always give you a good mangold crop, unless the skies are adverse.

Thoroughly decomposed manure for carrots. They will grow just as Mr. Thompson said, if you put on green manure.

For turnips a small quantity of nitrogenous manure and of vegetable decomposed manures; not a large quantity, but phosphates. Turnips require phosphates; that is a rule you can apply. Why they require phosphates is more than I can tell; but they do. You can apply your phosphates in any way you see fit. Not an extra quantity of coarse manures, not an extra quantity of animal manures, but phosphates in some form or other. These are the manures for roots.

I have got the land ploughed and manured, and Mr. Ware has told you how to prepare your seed and sow them. Now you have got the crop off, we will suppose, and what is the condition of your land? It is just in the condition of all land from which you have taken a tremendous crop of anything—whether corn, tobacco or anything else. You cannot raise a great crop of anything, (and you do not want to raise a poor crop,) without exhausting the land to some extent. The raising of root crops demands superior cultivation. I use the common phrase, "exhausting the land." What the roots do to the land I do not know, but they do put the land in such a condition that it requires extra cultivation to bring it back again; and extra cultivation, I believe, will be more than repaid.

Mr. Stockbridge. Supposing on one side of a field you sow turnips, and on the other plant potatoes, preparing the land properly for each crop, and then follow those crops with corn, which will injure the land most?

Dr. Loring. I should be slow to follow either with corn. I don't think I would plant corn after potatoes, or Swedish turnips, or any turnips. The flat turnip I don't think of calling a root, any more than I do of calling the clam a fish. We are not discussing the question of raising five hundred bushels of flat turnips to the acre; we are discussing the question of raising root crops. I cannot answer the question from experiment. If

I took my choice, I should follow the potatoes with corn rather than the turnips.

The comparative value of the crops you can raise upon an acre of ground, properly prepared for mangolds, is hardly the question. Nor is it the question, whether 1,500 bushels of mangolds would not be better than one hundred bushels of corn, because you would not be likely, on such land, to get anything like one hundred bushels of corn; it has not the depth to it. But 1,500 bushels of mangolds are worth more to any man for his cattle and sheep than any hundred bushels of corn that ever grew in Massachusetts; there is no doubt about that at all.

There is a difference in the value of these roots for stores. Turnips for growing cattle; they are as natural to them as oats to a growing horse, after he gets to be four or five years old. A bushel of turnips for fifty sheep—there is no better food in the world. I have tried it over and over again. I would rather have it than have a pint of corn for each sheep. You can easily figure which would cost the most.

I have no time to go into this matter at length, and it has already been discussed so intelligently, that it is not worth while, although men differ somewhat in their views. These are my general views, and the result of my experience.

Now in regard to fertilizers. Do not let us condemn the fertilizers themselves, because we condemn the manufacturers of them. It would not do for the Board of Agriculture of Massachusetts, or any other agricultural body, to undertake to declare against artificial fertilizers. That would not stand the test. While we condemn the manufacturers, I repeat, do not let us condemn the manures. The best of them will stand the test. Bones—how shall we get them into the best form? I doubt about grinding them as fine as meal. They want some solvent, and then they will be decomposed by the gases of the soil, and be made available. Mr. Coleman said of agricultural chemistry, that it had done one thing, and but one thing, and that was, it had dissolved bones in sulphuric acid. Bones are the fountain of a great deal of fertilizing material. Put them in properly, and they will be of great value. Crushed bones I like well; bones dissolved in sulphuric acid better.

One word about ploughing in manure in the fall. I would never attempt it. I have ploughed in manure in the fall, and in a fortnight afterwards, it was frozen as solid as if inclosed in Norwegian ice. It did not decompose at all. What is the next process? It is thrown up and washed out in the spring of the year, before the atmospheric influences upon it are such as to decompose it, and before it is properly worked into the soil, it is about all washed away. I would plough my lands in the fall, if they were heavy, not if they were light; I would have my composted manure ready in the spring for my carrots, my green manure and salt for my mangolds, and for the growing of turnips, a little barn-yard manure and plenty of phosphates.

Adjourned to 2 o'clock.

AFTERNOON SESSION.

The members of the Board were called to order at 2 o'clock, and the subject of Fruit Culture was announced for discussion.

FRUIT CULTURE.

Mr. CLEMENT, of Dracut. *Mr. Chairman,*—I do not feel competent to do justice to this subject by any knowledge of my own, although I must confess that I am considerably interested in fruit culture. Perhaps I may as well begin by repeating a question that is often put to me: "Is there any encouragement to plant an orchard?" And I will proceed to state why I think there is encouragement to plant orchards. In the first place, I would like to say that I am not at all discouraged because we have one, two or even three successive failures. I remember some forty-five years back, and I recollect that when I was a little boy my father used to raise apples—not many of them grafted fruit, to be sure—but mainly the old-fashioned cider apples, as they were called. Some years he would make twenty or thirty barrels of cider; other years none at all. As far as I can recollect, we have always experienced these failures in the apple crop from time to time. They will happen to us occasionally; it is reasonable to expect them. That is one reason why I would not be discouraged—why I would not entertain the idea that apples are always going to fail because they have to a considerable extent failed for three years in succession.

Allow me to say, before I go any further, that I am free to admit that my own apple crop has never been so profitable to me as during the last three years, because I have had some apples every year, and the few I have had have brought about as much money as the large crops I had when everybody had apples, and I was obliged to sell them at fifty cents a barrel, as in 1862, or give them away, which did not cost so much as it did to sell them.

Now, in raising apples, what should be the first inquiry? I take it for granted that it is going to be profitable, to some extent, at least, to raise apples for the market; and as to the kinds we are to propagate, that depends entirely upon surrounding circumstances. In one instance, it may be profitable for a man to raise a good many early apples, if he is in the vicinity of a good local market and desires to attend the market constantly. If he is at a distance from a local market, and not on a line of railroad, but on good land to raise winter apples, it may be more profitable for him, if he has other matters that he desires to attend to in the fall, when we usually sell our early apples, to plant the Baldwin, and such other varieties as he can take to market and sell in the mass, or later in the season.

Then some will inquire which are the best and most profitable varieties—which will bear the best—which are the most hardy. There is a vast difference in the productive qualities of apples, and in the hardiness of the tree also—in its power to resist deleterious influences. I will cite an instance here. A few years ago, I planted an orchard containing ten rows of trees, eleven trees in each, two rods apart. Among them, I planted a row of what we call the Foundling apple—known in the vicinity of Boston as the River apple; and the second row from it was the Gravenstein. The Gravenstein is a fine apple, and bears well in some localities, but I am sorry to be obliged to admit that it has been a failure with me. I can assure you, gentlemen, that I have harvested more barrels of these Foundling apples than I have half pecks of the Gravenstein; and yet the trees are of the same age, planted at the same time, and on the same soil. The soil is moist and rather too heavy; I should prefer a drier soil. I did put in under drains and drained it, but not to the extent I should like to have done. Upon inquiry, I find that other gentlemen succeed better with the Gravenstein.

Then there is another variety which I regard as excellent, coming a little later than the Porter—the Holden Pippen. I have heard it called the New York Pippen. It is a large white apple, with a pretty long stem ordinarily, and with little minute dark spots in the skin. It is surely not the Fall Pippen of New York, with which the New York market is commonly filled in October. That is a short-stemmed apple, and a very good cooking apple; but it is different from the Holden.

A MEMBER. Do you know the origin of the Holden?

MR. CLEMENT. A gentleman by the name of Conant, who claimed to know all about it, gave me the history of it. He said it originated in Holden, Massachusetts. I presume he thought he was telling the truth, and I do not know anything to the contrary. He appeared to be a fair-minded man, and I can see no motive that he could have had for misleading me in that respect. That is all I can tell you about it. He called it the Holden Pippen, and I followed him and mean to insert that name in my catalogue when I get out one. It is a good bearer, but some years there are a good many of them a little knurly, on my soil, and in many other localities. I know the apple in many places well, I know the character of the gentlemen who raise it, and it grows very large and very fine almost always, though there are a few exceptions.

Then, for an early apple, I would have the Early Williams, (Williams' Favorite,) although it is one of the poorest growing trees in the nursery I ever saw, I must confess; ripening the latter part of August and in September. It is a large, oblong apple, narrowing a little towards the eye, preceding the Porter, and continuing up to the time when the Porter is ripe. They grow quite large, are very dark red, and are easily distinguished from any other variety. They are raised in considerable quantities in the northern part of Middlesex County, and conveyed to the Lowell and Boston markets. Mr. Reed, of Westford, sold a good many last year in Lowell, for five dollars a bushel; though he did say they cost him ten cents a piece to raise them that year, because he had to spend all his time in his orchard, fighting the canker-worm. If he succeeded in diminishing the number of the canker-worms to such an extent that they will not trouble him so much hereafter, his future crops will not cost him so much.

Then there is another variety—a little earlier than the Williams, even. Some, perhaps, will not agree with me in regard to the propriety or expediency of propagating this apple. I allude to the Red Astrachan; a large, dark-colored apple, round, but a little flattened,—very different in shape from the Williams,—a pretty sharp acid, but growing to a good size, with a white bloom upon it which makes it very beautiful. It is an apple that will command a good price in the market, and it is earlier than the Williams. I should recommend that as a good early productive apple, and hardy in tree.

Then, for an early sweet apple, I don't know any better than the Early Sweet Bough. The August Sweeting, I think it is called in some localities; the Large Yellow Bough of Downing. It has quite a number of synonyms, I believe. It is not a great bearer; you never have to shore up the branches, because of the weight of the crop; but it is an annual bearer. It is one of those kinds that bear sparsely, and bear every year, to some extent. I have always regarded it as profitable. It always commands a good price in the market, for a sweet apple.

Then there is another which is a trifle later. That is to say, it is a little later in beginning to ripen, but it is gone about the same time that the Early Sweet Bough is. This is the Connecticut Sweet; in some places the Golden Sweet, though there is another. It is not so yellow as one Golden Sweet I have seen, but it is the Golden Sweet of Connecticut. It is a light-colored apple, a beautiful growing tree—better than the other—a good bearer, and salable. These two, for early sweet apples, I regard as good as any within my knowledge now.

For the later varieties, I would mention the Porter. We cannot very well discard the Porter, although in some localities it does not do very well. It is prolific, and we should scarcely feel like doing without it, anyhow. It is an apple that is tender with me, and should be handled as carefully, or more so, than you would handle eggs, if you were to carry them to market. It would never do to carry them in a bag, as you would potatoes. If you do you will have a remarkable looking bag of apples when you arrive at market. That is a good apple. Then there is the Lyscom. I hardly know what to say of that. It is a good growing tree, a good bearer also, and the fruit grows to a fine size. It is known in some localities as Osgood's Favorite. It is a little too mild to suit almost everybody. People remark to me sometimes, when I am in the market, that they cannot eat the Lyscom apple—there isn't body enough to it; they don't know they have apple in their mouths while they are eating it, because they cannot taste it. Last autumn they grew very large and sold finely. I do find a few families who like them, and some shops where they are willing to buy them, where they sell readily. The skin is rather thick and tough. That is one objection; but I do not regard it as much of an objection to an apple you are going to carry to market. It is not delicate enough. for the table, but on account of its fine size and showy appearance it is a good fruit for the market. I find in my market—Lowell—that it is the showy things that sell. I recollect making that remark to a lady, (I believe she was a maiden lady,) and she said she had been made to feel very sensibly that it was the looks of a thing that sold it.

There is another still later apple that I regard as an excellent one to raise for market and table use; that is the Mother apple. It is a very late autumn apple, a good bearer, pretty hardy in tree, an upright grower, and makes a handsome tree in the nursery. It is in eating about the time of the Hubbardston—perhaps beginning a little before—but different in flavor and different in character. It is a little more juicy and more tender than the Hubbardston, and would suit some tastes much better.

I regard the Hubbardston as one of the most profitable varieties to cultivate. In our locality it did remarkably well this year. I never knew them fairer or handsomer, and the trees bore just as full as we desired to have them. The Hubbardston is a good market apple, but it is a little too mild, as almost everybody says. They do not like to buy it for cooking. It does very well to put upon the counter, and many families like the apple very much. There are some exceedingly partial to them. I had a plate of them on exhibition at Lowell, and a gentleman came along and wished to know if I had any for sale. I said I had a few, and he said he wanted a barrel of them for his daughter, for there was no apple in the world she liked so well. You will find a good many who prefer them to the Baldwin, especially before spring. I never eat a Baldwin until spring myself.

Now, as to the Baldwin, I would say that, although it is a very handsome growing tree in the nursery, the wood is not so hardy as that of many others. It is liable, in some instances, to winter-kill. I have had them freeze to death in the nursery without being moved at all. They froze in the ground where they grew, so as to be as black as your boot, in the spring. I attributed this, in some instances, to getting the soil a little too rich, which kept them growing late in autumn. Being in pretty heavy soil, and wet also, the fall rains set them growing vigorously, and they froze up in that state, while the sap was still flowing. This brings me to a point where I would like to make a remark in relation to something that was said by Dr. Loring, the President of the New England Agricultural Society, at Concord, N. H. He took the ground that the raising of fruit had become an effort of science ; that it could not be profitable any longer from the fact that the trees had become sickly through the country, and were failing all round ; but he said that persons who were determined to have apples or any other fruit should put them out and drive them, and get all they could at once. That might be safe for some varieties, but I do not believe it will ever do here in New England—northern New England, at least. I think that to set out an orchard of Baldwin trees, and drive them very fast, would be to risk injuring them seriously ; that they would be likely to be brought into the condition in which I have found mine—frozen to death. I remember that my father planted an orchard of Baldwins, and when they had got to be of considerable size, there came a pretty deep snow, before the ground froze up, and then there came a warm spell, and started the sap, and they all froze to death that winter. The trunks of those trees were three or four inches through, and every one died. I have known other similar instances. It is my opinion that the Baldwin and the Ladies' Sweeting should not be driven here ; that they will not be able to endure our New England winters so well as when growing more moderately. When they make their wood early in the season, and ripen it so that the terminal bud is sealed up and all right before the cold weather comes on, then I do not apprehend the least danger of any apple-tree freezing to death.

I have alluded to the Ladies' Sweeting. I regard that as a most excellent sweet apple for winter use. It holds its freshness and good qualities late in the spring. It is a beautiful apple in appearance. It is astonishing how late they will grow, if you will only let them hang upon the tree. At the time we usually have our exhibitions, I am very much perplexed to find good specimens to carry to the shows. They look green, as though they ought to hang another month. They grow till about the last of October, and then they swell off large and fine, redden all round, and look beautifully. It is remarkably prolific. Not so hardy in tree as a great many other varieties; a little liable to have the canker; and I had one row of them in the nursery, on pretty heavy soil, and every one of them froze to death down to the snow-line; but they started again above where they were budded, so that I did not lose the trees outright; but still it was a loss, for they did not come up so handsomely as the first time. They should be grown upon high, dry soil, comparatively, and not forced, as it would not be safe to force them. They may be grafted on some tree more hardy in character, like the Blue Pearmain. Those who know it, express the opinion that that wood (the Blue Pearmain,) is almost as hard as thorn wood, and cuts like it. Poor as the apple is, the tree will bear almost anything, and makes a very good stock to graft upon, it is so hardy.

Then there is another point which may be interesting to some gentlemen. I have noticed in lifting trees in the nursery, that the roots of different varieties assume different forms. For instance: the Blue Pearmain strikes its roots downward, while the Hubbardston Nonesuch will strike its roots out near the surface. I know this is so, for I have noticed it many times. I find that some trees will have a vast amount of roots—more even than much larger trees in a row alongside. Why it is so, I am unable to say; I know the fact. The Hubbardston apple has a marked characteristic in this respect. The trees scarcely ever throw their roots so deeply as many other trees. They make excellent trees to plant. They do not grow little fine hairy fibres, without any large roots; they have plenty of them, almost always.

A MEMBER. Do you consider the Blue Pearmain a profitable apple to raise?

MR. CLEMENT. No, sir, I do not. Occasionally it grows very large and fine in appearance, and will sell tolerably well on account of its beauty of appearance; but it is more insipid than the Lyscom, and a tougher skin, also. I have known it to bear very great crops, but it is ordinarily a shy bearer. I recollect a neighbor of mine had twelve barrels from a tree. It was astonishing how it did bear. I think one man picked ten barrels in a day. A gentleman from Brighton was at an exhibition we had at Lowell, and bought some of them to put on an exhibition table in Boston. He said they were the finest he ever saw. I cannot say whether he took the premium or not, but I believe that was the purpose for which he bought them. It is a little against the rules, but I know people do such things sometimes.

Mr. STEDMAN. How does the Blue Pearmain strike its roots?

Mr. CLEMENT. They strike downward. The Northern Spy, I think, strikes its roots very similar to the Hubbardston. There are some modifications to this rule. You will find that all trees strike their roots deeper in a warm, open soil than in a heavy, wet soil. They do not like a cold, hard soil; and if the soil is very wet and heavy, almost all apple trees will strike their roots out near the surface.

I would like to make an inquiry of the gentlemen present in regard to the Haskell or Ipswich Sweet?

A MEMBER. The Haskell or Ipswich Sweet was originated, years ago, by Dr. Haskell. Mr. Cole described it in his book as the Haskell or Sassafras Sweet.

Mr. DODGE. I have seen the original tree. I think I carried the apple to Mr. Cole. "Sassafras Sweet" is a fancy name he gave it. Some of his family said it tasted like sassafras, but I could never see it. It went to New York and appeared in Thomas's book under the head, "Haskell's Sweet." That tree is on a farm in the further part of Ipswich from here, and is a very fine grower. The fruit lasts but a short time; it is generally gone by Thanksgiving; but while it does last it is very juicy; you cannot eat it without having the juice run out of your mouth like that from a cider-mill.

Mr. CLEMENT. I have left them as long as they would hang, and I find they are vastly better to hang until they bleach out. They will be quite light-colored, and have more of this high flavor, and the juice will run out of the mouth, as you say. It is a most capital apple. I have had some of them until within a week. I never saw better fruit, and scarcely any tree more prolific, for the spurs set from where the branches start from the stem throughout. The spurs grow all round the tree in just such form as is right and proper to enable the tree to sustain an immense weight. They are almost, in that regard, equal to the old-fashioned Green Winter Sweet; and I think I saw, some few years ago, at an exhibition in Boston, that Robert Manning had one plate of apples labelled "Pelham Sweet," and another "Green Winter Sweet." I told him the two were identical. He had not, up to that time, thought of that fact. His father had obtained them under these two different names, (and he was a man who wanted to test everything he heard of,) and so his son had these two plates of apples, which were identical, labelled with these two different names. This is one of those varieties that grow so full on the inside as to support an enormous weight, and it is very prolific. The tree, by the way, is not literally healthy; it is liable to canker and to black circles round the bark; and without very high cultivation the apples are poor, a light yellowish color, dry, and not half as good in quality nor half as large as those growing on nicely cultivated trees. When well cultivated they grow to pretty good size, are very juicy, and hold green all winter; while others, grown on a tree three rods off, perhaps, that are neglected, will be small, and turn yellow in the same length of time, and nobody not familiar with them would suspect they were the same apples.

There is one more variety of which I had forgotten to speak—the Orange Sweet, as it is called in some places. I think Mr. Cole remarked to me once that it should be called the Russet Sweet. It is ripe in September and October, and is an enormous bearer. It is a good autumn market apple; not so good until fully ripe, and then it is very sweet, rather juicy, and I regard it as very profitable to cultivate, if any sweet apple can be so, because you can get such remarkable crops. From all the young and vigorous trees that are well cared for you will get a good crop every year, and they sell pretty well, or did this year, at least. They sold readily for five dollars a barrel in our Lowell market at the season of picking. But even if it would not sell, I should regard it as worth raising for swine or for cattle either. That is another advantage in raising an abundance of sweet apples. If we ever have a surplus beyond what we want to use ourselves, and what the markets will take, we can cook them and use them as food for our stock to advantage. I have no doubt that it is profitable to raise sweet apples for stock and for swine. I know that some of my neighbors have tried the experiment with pigs and store hogs, in years when there was an abundance of apples, and they were hardly worth carrying to market, of boiling apples and feeding them to their pigs; and I have heard many of them remark that the pigs grew just as well as they would on something else. I do not mean that they were fed on apples exclusively, but apples mixed with other things; and from experiments I have tried myself, I have no doubt that it is so.

Mr. HUNTINGTON. Is there a Strawberry apple?

Mr. CLEMENT. Yes, sir. It is a New York variety, I think. There is an early Strawberry apple, certainly; I don't know whether there is another or not.

Mr. HUNTINGTON. Ripening about September, I think?

Mr. CLEMENT. Yes, sir. I bought a tree at auction once, and kept it a good many years. Once in awhile it would blow, but I could not get many apples from it. I never got half a peck at a time. We would get occasionally a few small apples, red all round, handsome, but too small and too poor a crop, and I worked the tree over to something else.

Mr. HUNTINGTON. The tree I am thinking of grew in Woodstock, Conn.; a large apple, very fine flavor, and not altogether red; striped, but a very handsome apple.

Mr. CLEMENT. Now, in relation to the expediency of growing apples. If a man has a sandy soil, or a soil that is low, and wet, and heavy, and cannot be sufficiently drained, I certainly would not recommend him to go into the raising of apples extensively, or any other fruit. I do not believe good apples can be raised on what we call pine plains. I have known persons to plant trees in such soil very frequently, but I never knew any apples to come from them.

A MEMBER. Do you know anything about the Red Russet?

Mr. CLEMENT. I have seen the apple in one or two instances, and I am told that it is very fine fruit; I have not tasted it. I am hoping to have some next year; but my hopes may be blasted, as they are sometimes.

Mr. HUBBARD. I have heard it remarked by some that they have had the Northern Spy set out for a considerable time, and do not get any fruit, and they have become almost discouraged with it; and I have heard others say, that if they would be patient, they would get fruit. What do you know in regard to the Northern Spy?

Mr. CLEMENT. Some fourteen or fifteen years ago, an acquaintance of mine said he could furnish me with some Northern Spy scions. I had heard a little of the apple, and said I would like a few; but when the scions came, my trees having all been grafted, I had no stocks to work them in except one pretty large Blue Pearmain tree. I cut the head from that, and worked the Northern Spy into it. It did not bear, until the seventh year, more than half a dozen apples, then it bore an excellent crop; as fine a crop as I desire to see on any tree. It rested a year then, like the Baldwins, which bear alternate years; and that is the case with almost all varieties which bear so fully as does the Baldwin. The second year, it bore another most excellent crop; they were very large, very tender and nice. I noticed that some of the apples would break upon falling from the tree. The skin is tender, like the Porter, and, like the Porter, they must be handled very carefully. I noticed at that time, that before they were fully grown, many of them began to decay, so that at harvesting time, there were a good many speckled a little, and a good many more that appeared as though they would be before long. We managed to sort them and sell them off early, and got a good price for them. But the next year when it should have fruited, which was a year ago, our apple crop was very generally a failure; and though the Northern Spy fruited, I think, as well as the Baldwin, it did not do so well; it had some apples, but they rotted a little. This year, it fruited again. I supposed, if it had borne a full crop last year, it would not have fruited this, but it did, and bore a pretty fair crop. But it had that old habit—a good many of the apples decayed; and I noticed, the day before I started to come here, that there were quite a number that were beginning to speck. I am a little doubtful in regard to that apple. I would not recommend anybody to propagate the tree extensively. It might be well enough to have one or two trees, but I am apprehensive it is not a profitable apple, not because it does not bear enough, but because it does not keep well enough. It appears to be a good, healthy tree. It is a clean growing, nice tree, has no black wood, and is late in putting out in the spring. We can lift them in the nursery up almost to the last of May. It is a little later than the Williams in putting out, and makes a beautiful head, and handsome, straight stem. We rather like it, on many accounts, but I fear it will not be profitable. I will not say it is not, but I should rather give it further trial before deciding that point.

I would like to say a word or two in relation to pears. And on that subject, I hardly know where to begin, because I do not regard pears as a fruit which people can propagate and succeed with as they do with apples; and I am quite sure, that in the north part of Middlesex County, if a farmer were to buy a hundred pear trees and set them out as he does apple trees, he would be a little better off to give the money to the nursery man, and leave the trees also with him. Unless he takes some special pains to get the right spot of ground, and prepares it with reference to the growing of pears, unless he shall have an open subsoil, and protection from the high winds, and the many other things which operate upon the pear tree to injure it in foliage just as it puts out in the spring, he will not succeed. I have tried the pear somewhat extensively, and it has been a failure with me, and all my neighbors who have tried it have failed. I have noticed, that in starting in the spring, there will come a windy time, and the leaves will thresh and blacken. The pear opens an exceedingly tender leaf; I know nothing more so. If anybody in the county is going to plant pear trees, he had better do it on a limited scale.

Mr. Ives. There is no doubt about that.

Mr. Clement. In making your preparations to plant pears, select your land where the trees will be sheltered from the wind. Here allow me to say, that we have some pear growers in Lowell, and in all our villages, where they make the soil. They dig a trench and fill it up three or four feet deep with different kinds of soil and rubbish, and a great deal of street manure, and thoroughly drain, so that the roots can penetrate clear down through the four feet; and then they protect the trees by high fences or the walls of buildings. There they get great pears, and good ones.

Mr. Hubbard. It was said yesterday that we ought not to trench deep, so as to induce the roots to penetrate down beyond the reach of the sun; they should be kept as much as possible on the surface. You speak of trenching four feet. That would carry the roots down beyond the reach of the sun.

Mr. CLEMENT. It ought to be remarked, at this juncture, that the pear is different from the apple; it inclines always to strike its roots down deep. You scarcely ever find pear roots on the surface, no matter where you go. They do not need to lie near the warm surface; and this soil which has been made is not a cold place, by any manner of means. One reason why the pear succeeds in such places, I think, is because it needs higher feed than the apple, and in this soil, which is made and filled up with street manure, which will decay by degrees and be rich for a long time, it gets higher feed and more nourishment than it could possibly get in an orchard, planted as we plant apple trees.

Mr. DODGE. I was told by a gentleman who has an orchard in Wenham, who is a very observing man, that he used street manure about his trees, and got the iron which is ground off of the wheels of carriages and the shoes of horses, which he said makes the trees healthy.

Mr. CLEMENT. Here again is another element. Wenham is in the lower part of this county, and I have always heard that in that part of Essex County there is a clay soil, which is very favorable to the pear.

Mr. DODGE. There is no clay in the soil I speak of. Further off, in Ipswich, there is clay.

Mr. CLEMENT. Then it is remarkable; but still, he may furnish the clay by the application he makes. My experience and my observation all lead me to believe that pears will do vastly better where there is considerable clay.

Mr. DODGE. A gentleman says there is some clay in Wenham. Judging by the surface, I thought there was not.

Mr. CLEMENT. If there was not originally, I should suppose there would have to be some applied to supply the deficiency.

Then I would ask, do you want pears for your own family or for market? If for your family, you will want some very early, some in the middle of the season, and some late. I have observed a great many pears as well as apples, their bearing qualities, and all their other characteristics; and I have found, that for an early variety, the Rostiezer is capital.

The Dearborn Seedling is a good pear also. In a warm soil it is excellent with us.

Mr. Ives. It is a very good pear.

Mr. Dodge. Excellent with me—none better.

Mr. Clement. Then there is the Bartlett. A little tender in tree; sometimes liable to freeze to death.

A Member. How is the Bloodgood?

Mr. Clement. With me, one of the more hardy kinds. It never has suffered by blight, like some others. I should say that it is a good pear.

Mr. Dodge. Why is not the Bloodgood cultivated, if it is so good a pear?

Mr. Clement. It is not cultivated extensively. One reason is this: It is not a very attractive pear in its appearance; it is a little too small, and the color is not attractive. It is early, and does not keep long. The demand for the trees is limited, and usually for private families. A man never buys more than one or two simply for his own use. It is not so well adapted to the market as others, because it is not showy enough.

Mr. Dodge. Is the Madeleine worth cultivating?

Mr. Clement. It is earlier than the Rostiezer; but if my observation is worth anything, I would say it is a tree exceedingly liable to blight, and the fruit liable both to break and rot.

Mr. Ives. It is tender, and discarded almost entirely.

Mr. Clement. It rusts upon the tree. It bears pretty well sometimes, and then it is astringent.

Mr. Ives. Sometimes astringent; a great bearer; not worth cultivating.

Mr. Clement. I sell a few every year—not many. No man would care to have more than one or two of the Madeleine.

Then, to come to something later, there is the Bartlett, which cannot be discarded. No man would feel that he could do without it, if he could get it. The Louise Bonne de Jersey is remarkably prolific and an early bearer. I think quite as good on the quince root as on the pear; I do not know that it is any better. It is a good market pear, ripening in October, after the Bartletts are gone, and after the flush of fruit in September is over; and sometimes we have had a great flush of fruit in that month. The Louise Bonne de Jersey always sells well here. It is large, and makes a fine appearance. Then the Duchess is still later.

A Member. What do you think of the Belle Lucrative?

Mr. Clement. The Belle Lucrative is sweet, melting and buttery. I don't think it is that turtle-egg butter that Professor Agassiz spoke of, but butter that is a good deal better—butter that relishes.

A Member. How is the Flemish Beauty?

Mr. Clement. The Flemish Beauty is a nice, clear-growing, hardy tree, (nice as the Bartlett;) but sometimes the fruit cracks badly and is almost a failure. At other seasons it is remarkably good. In some localities it is capital; in others, insipid. It rots inside first. You may think you are going to have something nice, but if you happen to pinch it a little hard your thumb will go through. There is a great demand for the tree, and will be for the present.

A Member. Would you recommend the Beurre d'Amalis?

Mr. Clement. I believe I would not, notwithstanding it is liked by some. It is a rampant and very sprawling grower as a nursery tree; I hardly know how it appears when in the orchard. It is a tree that needs severe cutting to bring it into form. The pear ripens early, and decays rather early, I believe.

A Member. It rots at the core.

Mr. Clement. I had that impression, but I did not like to say so emphatically, because I did not know. It is astringent; or perhaps I ought not to say astringent. It has that flavor which suits some palates—the champagne flavor, so called. I have no fancy for it.

A Member. What do you think of the Maria Louise?

Mr. Clement. The Maria Louise I do not know. I remember, when I first began to raise trees, I came down to Salem and bought a lot of trees from a man, and among them was a Maria Louise; but I never got a single pear, although I had it twenty years. It died last year.

A Member. The Belle Lucrative?

Mr. Clement. I have spoken of that. It is a capital pear, but in our locality liable to blight in tree; to die off, branch after branch, until it is gone; and sometimes a tree will die outright in one season.

Mr. Dodge. That tree never blights here, and is considered by many cultivators at the head of the list.

Mr. CLEMENT. I would say, too, that it is one of the best pears, when you can get it to bear; but so long as it is liable to fail with me, I would state that fact. If I could keep them alive and bearing, no amount of money would tempt me to part with them.

Mr. IVES. Is your soil moist or dry?

Mr. CLEMENT. I had a row of Belle Lucratives beginning in a hollow and extending on to a hill.

Mr. IVES. In a clay subsoil?

Mr. CLEMENT. I think not. I think there is but little clay in my soil, any way. It is not adapted to the growing of pears. I remarked, in the beginning, that pears with me had been failures. But I have seen them grown in the city of Lowell very large and fine indeed.

Mr. IVES. I have seen the blight on the Belle Lucrative.

Mr. CLEMENT. The Duchess is the pear more generally planted in our region than any other late pear. It grows large, and some say it is a capital pear; others, that it is about second-rate; and occasionally a gentleman will say it is third-rate. Opinions vary in relation to the quality of the fruit; but at any rate, no matter about the quality, it is profitable to raise, because you can always sell it, and at a high price. It is so fine in appearance, that, coming at a season when fruits are comparatively scarce—in November (it can be kept up to December sometimes, but November is the month for it)—it always commands a high price. I hear of their being sold for six dollars a dozen.

A MEMBER. What varieties of pears are least liable to throw off their leaves before frost comes? I find a good many of mine throw off their leaves four, five or six weeks before the fruit matures. Some varieties do it every year.

Mr. CLEMENT. I am glad that matter has been alluded to, because I might have overlooked it. I have had some such experience myself. I should say that the Flemish Beauty was the worst in regard to that; it casts its foliage before the pears are ripened. Of course the fruit is thus left unprotected, and the pears are worthless. The Louise Bonne de Jersey does the same thing sometimes. My grounds, however, are not a criterion by which you can judge of these things. Another man's experience would be different from mine, especially where there was clay in the soil. I do not think there is any clay in my soil, and some of it is hard-pan. After you get down two feet it is pretty hard, and in some places we have to use the pick. It is ill-adapted to the growing of pears, in my estimation. Very frequently the Flemish Beauty foliage comes entirely off and leaves the pears naked; and sometimes the Winter Nelis does, but less frequent than the Louise Bonne de Jersey.

A Member. Does the Urbaniste ever shed any of its leaves?

Mr. Clement. No, sir; it is always good with me, but a poor bearer. I do not know why it is; I am very sorry for it, for it is a most capital pear. I have seen them raised in Lowell which were exceedingly fine; but on my grounds it is one of the poorest bearers we have.

A Member. How about the age?

Mr. Clement. These have age enough. That is to say, they are twenty-five years old, and ought to bear in that time.

There are a great many other things which might be said in relation to these fruits; but I have already occupied too much of your time, and there are some experienced fruit-growers in Essex County, which is famous for them, and I would much rather hear from them than say anything more myself.

Mr. Dodge. Have you had any experience with the pear which is considered the best we have—the Beurre d'Anjou?

Mr. Clement. I have no doubt myself it is one of the very best of winter pears—better than the Winter Nelis. It cannot be kept quite so long, perhaps, as the Winter Nelis. It makes a beautiful tree, forming a pyramidal head naturally, without much clipping or pruning, and the fruit is large and fine in appearance. I remember once hearing Colonel Wilder make a remark like this: that he had spent $20,000 in importing pear trees, and if he had never got any other than the Beurre d'Anjou, that alone would pay the nation in his opinion. I remember, too, that on one occasion, about the last of January or early in February, he brought to Mr. Flint's room at the State house, where the Board of Agriculture were in session, one of those Beurre d'Anjou pears, which had begun to rot upon the outside, and stated that several days prior to this he had scooped this little speck out, and had brought this specimen up there to show that they could be kept sometime after beginning to decay by scooping out the decayed spot. They never begin to rot at the core, but when they decay begin on the outside, so that it is always perceptible.

Mr. Hubbard. If the gentleman had gone a little further back, and told us what should be the mode of procedure in raising pears, it would have been of great value to us. I have noticed, so far as my experience has gone, that there is an increasing interest among the people in regard to fruit, and more and more fruit trees are continually planted ; but only a small proportion of those who have set out trees have met with much success. Now, it has occurred to me, that the difficulty was, that they have heard these accounts of various kinds of pears, that they were very nice indeed, and upon that have purchased the trees and planted them. Now, what people want to know is, what shall be their course of procedure when they purchase those trees and plant them, to bring them into bearing condition, and to have them flourish well. There are a great many people who have purchased apple trees, and set them out, and I have followed the trees along, and noticed that they never succeed in getting anything ; and it seemed to me that it was to be attributed not so much to the soil as to neglect. In the discussion this forenoon, we talked about the root crop and everybody said it needed constant care ; that the weeds must not be allowed to grow ; that if they went a week too long, it was a serious injury to the roots. Now, if we set pear trees or apple trees, or any other fruit trees, must they not have as much care as we give to these other things ? The idea seems to be that all we have got to do to obtain plenty of fruit for our tables, is simply to pay a dollar or two for a tree and set it out. That is very little indeed ; but are we going to get, in a few years, delicious pears from those trees that we set out, without giving them the care which we heard this morning all these other things need ?

I hope Mr. Clement and others will take up this matter, and let those who wish to set out trees understand that something more is required than purchasing and planting a tree to get the fruit.

R. Ramsay. With regard to one apple, the Northern Spy, I would say a word, because I fear that some will be deceived by it. If a friend should give them the apple, they would say, " Yes, I will certainly have some of those trees, or, I will have some of those grafts, if I can get them." I have spread round too many of them, I am afraid. Some of my neighbors got a tree or two, and they would almost guard them at night, they were so choice. The tree grows thriftily, evenly, makes a pretty head, grows very thick and bushy. I got a few of the grafts. I had a tree that had never developed its fruit, and I thought if I could get some of these grafts to put into it, I should get some fruit. I did so, and at the proper time after grafting, I got the fruit, and it was excellent fruit, splendid fruit; but it had that defect which the gentleman tells us it has—the apples would rot on the tree. I had apples of that kind which grew until they measured, I think, from ten to twelve inches, and then prematurely ripened on the tree and fell off. But I would give them to my neighbors to taste of, and they would all say, "That is a splendid apple." The tree that I took these grafts from had been standing twelve or fifteen years, and my neighbor who owned it had got vexed with it, and wanted to cut it down. "No," I said, "bear with it," and he did. He has raised some of the fruit, but there is the same difficulty about it. I have given away a good many grafts of the kind, but I think the tree is an unsafe one to raise, though there is no better apple grown, if you can get it; but there is the difficulty. It has a tender skin, will rot on the tree, and is not what we want. The New York Northern Spy is a different apple. It seems to be born in a different climate, and keeps better. One of my neighbors tasted of it, and gave it great praise. He brought the seeds home, and said, "Be very careful of them; I want to raise some of the same kind." He knows about as much in regard to raising fruit as a great many other people. I speak of it to caution people against experimenting with this tree.

Henry K. Oliver, of Salem. Mr. Clement has spoken of the difficulty of cultivating pear trees. I have had but little experience, but the little I have had has not been attended with much difficulty. I moved to Lawrence from Salem in 1849, when the town was rather in the rough. After building a house, my great desire was to make the most of what little garden there was. There was something like five thousand feet of exceedingly sandy land. The soil was so sandy, that it was necessary to cart off a considerable portion, and I carted off, I should think, six or eight inches of the depth of the whole five or six thousand feet. I then brought in from the meadows and from a clay bed in the neighborhood, I should think three times the amount I had carted off of clay, meadow mud, and leaf mould. Those three articles I very thoroughly worked with the sand. I trenched from one side of the garden to the other, throwing back the sand, and mixing the other materials in. That I did in the fall of the year, and in the spring, I set out about twenty-four pear trees, eight feet apart, of the kinds known about here as the most valuable. I took no particular pains, except to set them out regularly, and there I let them stay, and they took care of themselves. If I found a branch sticking out, I trimmed it off, desiring to have pyramidal shaped trees; and from 1852 down to 1866, those trees (with the exception of two or three which from some cause, I don't know what, died,) have borne successive crops of pears, and in most years, the crop has been exceedingly abundant. Now, whether the mixture of soil which I made is peculiarly adapted to the pear or not, persons more familiar with such details can answer, but these are the facts in relation to the growth of fruit in my garden at Lawrence, on the banks of the Merrimack. My trees were all dwarfs.

Then there is another point which I have not heard mentioned here at all, which I should like to have gentlemen with small gardens think of a little, and that is, the cultivation of double dwarf trees in pots or tubs of the capacity of about a pail. A painter's tub about twelve or fifteen inches across, and the same number of inches deep, or a large sized flower-pot, fifteen inches across and fifteen deep, should be filled with carefully prepared soil, and the tree planted. I begin with trees about two years old; better in the fall of the year than any other time. The pot must have a much larger orifice at the bottom than ordinary flower-pots—at least three inches in diameter. When the soil is put in, it must be pressed down with the hand or rammed in; it must be rich soil, and room must be left at the top, where liquid manure can be poured in as the tree shall need it. The third year, whether the tree be peach, pear, apple, or cherry, you will begin to have fruit, and a great deal of it, for so small a tree. From a peach tree raised in that way, three years old, I took this year fifteen well grown peaches, and I have known from thirty-six to forty and even fifty taken from a tree. The tree is within your grasp; you can manage it, take it up, and carry it from one part of your garden to another. I should add, that you may place the pot in any convenient part of your grounds, with a good exposure to the sun, set it about six inches deep in the soil, and the tree will thrust its roots through the pot and then through the orifice, and make its way down into the soil underneath, and there feed. In the fall of the year, about the 15th of November, you will lift the tree carefully, cutting off whatever root may have thrust itself through the orifice, put it in the cellar, away from actual frost, and there keep it until the next spring. I have now some fifteen or twenty of these trees, packed away in a portion of my cellar, where the thermometer does not get down to zero, nor is it hot. In the spring, I shall replace them in the garden, and very soon the tree will begin to thrust its roots through this orifice, and feed upon the soil and go to work preparing its fruit. That is a very pleasant way to raise fruit for persons with small gardens, who want a pretty horticultural or pomological plaything. This is the mode of culture commonly pursued in Japan and China. In the garden of which I have just spoken, that I made at Lawrence, my son-in-law, who resides there now, has some forty or fifty peach trees, about a man's height; and in the neighborhood of Boston, in the garden of Mr. William Gray, Jr., there were, three years ago, three hundred peach trees, of various sizes, raised in this way, and in the fall of the year, a very large crop was taken from them.

Mr. CLARK. What kinds have you raised?

Mr. OLIVER. I had the Crawford, two or three varieties, late and early, the Stump-the-World, I think, and the Early York. I had only about half a dozen varieties.

Mr. TAYLOR. My excellent friend, Mr. Needham, of South Danvers, has had some fifteen years experience in the culture of small fruits, and I would like to hear from him.

Mr. NEEDHAM. It is not my province to speak in public. My province is in dealing with the fickle goddess Pomona; and sure enough, she has been very fickle of late years. One of the greatest difficulties we have labored under in the cultivation of pears has been that we have made an error in selecting the bottoms. Nearly all the good bearing pear trees in the city of Salem and vicinity are worked upon English bottoms. Those bottoms have very many fibrous black roots. The American varieties all have light yellow roots; but some trees brought from New Jersey, grown upon red shale soil, have answered nearly as good a purpose as those English bottoms. All those grown on bottoms raised from our old pears, such as the Button pear, have very poor roots, and will almost always blight before they are capable of being worked, and the buds worked upon them will blight, quite often, and if they once blight they will always blight, and the tree is worthless.

With regard to small fruits, such as strawberries, we in this vicinity cannot cultivate the strawberry as we would like to. We have one great plague, and that is the robin. We would like to cultivate the strawberry in hills, but if we plant those varieties we want to cultivate in that way, they want nearly a foot square to each hill to get the best fruit and the largest quantity. But if so planted, the birds come along and begin to pick, not one, but the lot; and there is no way of getting along but by covering the ground. Therefore we have to give up the larger berries and go into the small, that will bear five or six plants to the pot.

With cherries we labor under the same disadvantage. We find no fault with what the robins pick when we are picking, because that they eat; but as soon as the cherries begin to ripen they begin to pull on them. I have seen a bird strike twelve cherries in succession, and every one of those cherries was ruined, because they will all rot afterwards. They will never leave off pulling until the fruit is gone; and as the public sentiment is now in regard to destroying these birds, we labor under that disadvantage.

Another trouble is the dor-worm. I suppose it is that. We set out our strawberry plants in rows, and one of these dor-worms will come up and eat off the roots of a dozen or twenty of them just below the surface, and the plant dies. That is another thing we have to contend with. I have lost an acre and a quarter by the dor-worm this year.

Mr. WETHERELL. Does the robin eat this worm?

Mr. NEEDHAM. No, sir; I never saw the robin eat any worm. At cherry time they come in the morning two hours to breakfast, at noon two hours to dinner, and at night two hours to supper; and they will spoil sixty cherries each time; there is one hundred and eighty a day for each bird. I believe we sold $145 worth this year, and they ate more than that while we were picking; and how many they spoiled before, that they didn't eat, I don't know. There were four rows of late trees, and from five trees at the ends of each of those rows we did not pick a cherry. The robins came and cleaned forty of those trees.

Dr. NICHOLS. I wish simply to say that it is a matter of regret that we cannot arrive at a greater number of fixed principles which will guide us in all cases. I have noticed in the discussion upon fruits, that, after all, we seem to be able to carry away with us but very little that will be of any practical benefit, individual experience is so diverse. I have a plantation of pear trees numbering some three or four hundred, some twenty years old and some three or four; and I have endeavored to observe pretty carefully both my own trees and those of my neighbors in the northern part of the county; and some peculiar and interesting experiences have come up in the course of my connection with those trees, showing the contrary influences which govern men in their judgment as regards trees. For instance, year before last, in one plantation, where there were ten pear trees of ten different varieties, the trees were apparently in very good condition in the autumn. When I mulched round them with manure in the fall, I left them in very good condition, as I supposed. In the spring I found that every tree of the Stevens Genesee variety took the blight, and every one was entirely destroyed. Of course my prejudices were immediately raised against the Stevens Genesee. The past winter I found that precisely the same influences had been at work upon the Flemish Beauty. Every one of that variety in this plantation was destroyed in this way. The bark became black, there was a little black spot upon each leaf, which gradually extended, the leaf turned yellow, and the trees died, and I was obliged to dig them all up; so that my prejudices were immediately raised against the Flemish Beauty. What will happen next year, I don't know. So that, as regards fixed facts in the culture of fruit, it seems to me we have not many of them. There are, however, two facts that are forced upon my mind very particularly with relation to pears; first, that the pear must have a deep soil; and, secondly, protection. I am inclined to think that pears will not flourish and bear fruit if you are deficient in depth of soil; and I am inclined to think so from the fact, that a neighbor of mine, who pays no attention to his trees at all, has abundant and most excellent crops; but his trees were set out in a deep soil, and are protected from the northerly and the easterly winds. I therefore think, that in setting out a plantation of pear trees, no matter what the variety may be, we can rely upon these two things as fixed facts or principles—protection and deep soil; and I think we can, if we keep in mind these two things, reckon with great confidence upon our crops. As regards the kinds which should be planted—that is, which are the most hardy—my experience leads me to think that all varieties will take a fancy to die, in spite of all we can do; and if I was asked which I would choose, I should hardly know what to say. I might mention the four varieties that have lived with me, and borne largely and continuously; but I should hesitate, because some other man might rise up here and say he had had exceedingly bad luck with those trees.

Mr. Oliver. Where is your plantation?

Dr. Nichols. In Haverhill.

Mr. Oliver. What is the soil?

Dr. Nichols. Silicious, without clay.

Mr. Oliver. How is it protected?

Dr. Nichols. Mine is quite exposed.

Mr. Oliver. Your neighbor's?

Dr. Nichols. They are finely protected by hills. The pear garden I refer to is Mr. Hale's, down on the side of the river. He has never paid the slightest attention to his fruit, having no interest in it; and yet, in that plantation of one hundred trees, I can hardly recollect a season when he has not had an abundance of fruit.

Mr. Oliver. The garden to which I have referred is protected on all sides.

Dr. Nichols. No doubt your success is due to that feature—protection.

Mr. Clement. In reply to the gentleman last up, I would like to remark, that we shall always have this little difficulty he speaks of; that is to say, we shall never get at any fixed facts by which we can be governed in all places. The gentleman says that he has met with ill-success with two or three varieties of pears in his garden; but a neighbor, two or three miles distant, may plant the same varieties, on soil of a little different character, and perhaps those very kinds that have died in this gentleman's garden will succeed admirably there, and some other varieties fail. It is exactly so, and I believe it always will be so; and for that reason I advise all persons who are going to plant pear trees, to plant them on a limited scale. Try a few varieties, and find out, if you can, what varieties will succeed; and then, if you dare, go into it a little more largely. But these failures will occur, and in some localities it will be one variety and in some another. So I have no hope that we can lay down a rule by which every person can be governed in planting trees. I have no idea that we can name a list of twenty varieties, more or less, that will succeed in all places, even within a circle of ten miles.

Dr. Nichols. This uncertainty prevails also, I think, in regard to the quality of different varieties of fruit. At a meeting of the Farmers' Club at Haverhill, one gentleman said he was going to graft his Vicar of Winkfield trees, as he was afraid the fruit was good for nothing. I advised him not to do so, and observed that one of our most distinguished pomologists, Marshall P. Wilder, had stated that if but one variety was to be preserved, it should be the Vicar of Winkfield. So it is that people's opinions differ in regard to the quality of fruit itself. It seems to me that in selecting pears, we should have reference not so much to the quality of the fruit as the hardiness of the tree. To be sure, the quality of the fruit is to be considered; but a tree that is vigorous, and gives us fair fruit, I prefer to a better quality of fruit, if the tree is liable to be winter killed and is a shy bearer.

Mr. Ives. I was struck by the remark of Mr. Clement, that in some localities a particular variety of pear will do well, which, in other localities, will fail. One of the most striking illustrations of this took place at the National Pomological Convention in Boston. The pears were brought up singly and discussed. Among others, the Napoleon,—a very juicy, nice pear, in some circumstances,—was brought up. One gentleman observed that it was one of the best pears he raised, and one of the freest bearers. He was asked where his location was. It was on Long Island,—such a place. Another gentleman got up in a few minutes and said he considered the Napoleon a very poor pear, indeed, very astringent, and an exceedingly shy bearer. "Where is your residence?" "I am about twenty miles from the gentleman who has just spoken, on Long Island, and both of us within about the same distance from the sea-shore."

It seems to me that the apple is decidedly the fruit for the farm, and not the pear. There is one very striking thing about all apples, that I noticed a great many years ago, and called attention to, in an article that I published—that apples grown on a given soil, or in a given region of country, were almost invariably, better than apples brought from abroad. I named at the time the Baldwin, the Minister, the Hubbardston Nonesuch, the Roxbury Russet, &c. I then contrasted them with the Newtown Pippin, which I suppose to be the best apple the country produces; but it must be grown on Long Island. I know a tree in this city which is a great bearer, but the owner does not consider it to be so valuable as another tree, the Hubbardston Nonesuch, which stands near it.

Then, with regard to the choice of apples, I think we had better take apples that are grown in our region. If we look over the list of apples, we shall find that almost all the finest apples have originated on our soil. Imported apples do not do well here. Southern apples do not do well at the North, nor do Northern apples do well at the South. Mr. Van Buren, of Georgia, says he has got about seventy varieties of Southern apples, and they all do well; and he says, "I have in my list the Newtown Pippin, the Foundling, the Hubbardston,"—and he names others of our New England apples—"and I don't think I have had a bushel on one tree for the last five years." We must have apples that are grown on our soil. Henry Ward Beecher says that is true of the West; that the best apples in Indiana, where he was, originated on the Mississippi, or at the West; and I think that is the case.

The gentleman (Mr. Clement) did not speak very well of the Lyscom apple. That apple, from the very circumstance of its having so many synonyms, must be a good apple. Here we call it Osgood's Favorite; up in Worcester County, you find it called Matthew's Striped; down in Marblehead it is, I am told, called the Nonpareil. I think these are all the Lyscom, raised in Southborough, Massachusetts. There are no apples that we can raise here so profitably as the Minister, the Baldwin, the

Hubbardston Nonesuch, the Rhode Island Greening, and other New England apples. The Mother apple, of Bolton, Massachusetts, is a very fine apple, and grown upon our soil.

I was a little struck with the gentleman's remarks about the Gravenstein. We thought it was going to lead the fall apples when we first cultivated it, but of late years, it does not seem to bear well, and people are dissatisfied with it. We had the same difficulty with the Flemish Beauty. It was a noble pear when we first began to raise it, on young trees, but as the trees grew old, the fruit deteriorated and became small. I recollect that at one of the exhibitions of our Society, there was a large dish of Flemish Beauties upon the table, but they were not one quarter the size they usually are, and I was troubled by individuals who came to me to know why the fruit was not marked correctly upon the table ; they could not believe it was the Flemish Beauty. And it not only deteriorates in size, but it cracks. I do not think it reliable.

We have a good many pears that do very well in a sheltered garden, but not in the open country. You cannot raise Gansel's Bergamot, that delicious pear, in the country, nor can you do well with the Winter Nelis, for that is a pear that is variable ; but if you want a pear that is almost, I may say quite, as melting and juicy, take the Lawrence pear, which originated on Long Island, and is a hardy pear.

In England they do not believe in raising stocks for the pear from their little shrubby pears, but use such pears as the Swansea. Here we raise a great many of our pears from the little Button pear for stocks. So far as my experience goes, I have found that there are three pears, natives of this country, and all of them of most splendid growth, that make the best stocks for pears that I am acquainted with—the Blecker's Meadow, the Rivers, and the Buffum.

Then, again, pears that have been cultivated out in the open country are hardier than others. I think the Buffum, of Rhode Island, is a very popular and good pear. That is a very good pear for raising in open culture.

I would say, with regard to those delicious pears called Beurre Boses, that three or four years ago, when the pears were cut off very much, and all the buds of the Bartlett killed, not only were the buds of the Beurre Bose killed, but the trees. Mr. Cabot, of this city, lost whole trees. I lost limbs as large as my arm. The Belle Lucrative was not injured at all, either in bud or wood. That year gave us a good insight into the hardiness of trees. The Bartlett is not so hardy with me as the Belle Lucrative—I mean the tree. We find the Belle Lucrative, the Beurre d'Anjou and the Louise Bonne de Jersey to be the hardiest pears, so far as our experience goes.

With regard to the culture of apples, (to mention that matter again,) I know of but two imported apples that are really desirable and fit for our culture here. One of those is the Ribston Pippin, and the other the Gravenstein; but, gentlemen, the apples grown on our soil—those apples that originated in this State or somewhere in New England—are the best apples for you to cultivate.

Now with regard to pears dying out. It is a remarkable fact that the pear tree has always been considered to be (and I have no question that it is,) a longer lived tree, naturally, than the apple. Why, then, do so many die out? Let me remind you, that of the million of trees that have been set out in Illinois and the Western country, not one, I think, is now living. But go to Detroit, and you see French pear trees that are seventy-eight years old bearing all the time. I think there are two reasons for the loss of so many of our pear trees. One is, the feebleness of the pear stocks of Von Mon's—and most of our delicious pears come from him. He has described his method of raising pears. He says he took the seeds from his pears before they were ripe, because he wanted to destroy their luxuriance. He admitted that that mode enfeebles the growth of the tree, and that there was no compensating vigor imparted to it. Another thing is, cutting off the tap root. I suppose those large trees were set out and grew where they were planted, without any reference to cutting off the tap root. I do not know why we do that, unless it be that we may take up our trees more easily, or think that they grow faster. That may be, but for durability I do not believe that is a good plan. A few years since I was up in Lynnfield, at Hon. John B. Alley's place, and he took me into his grounds and showed me eight or ten trees that were suffered to grow up without having the tap root cut off, and they were about the most thrifty trees I ever set eyes on. He said it was not safe to take off the tap root. I think these are the two reasons why our pear trees die out: that Von Mon's method of raising enfeebles the stock, and that cutting off the tap root shortens the life of the tree.

Mr. OLIVER. Do I understand you to recommend the raising of apple trees rather than other fruit?

Mr. IVES. I say it is a better fruit for the farmer to raise; it is more profitable.

Mr. OLIVER. What shall the farmer do with the canker-worm?

Mr. IVES. I think we shall get rid of the canker-worm. It has been going from one place to another. Down here on the Merrimack, I think, it is only on one side of the river.

Mr. OLIVER. Has the canker-worm got twenty miles from the seacoast into the interior?

Mr. IVES. I cannot say; I only know that it is in Michigan. A former Secretary of the Michigan Society took out a tree-protector, because he wanted to see if he could not find some way to get rid of the canker-worm.

Mr. OLIVER. Are you sure?

Mr. FLINT. There is no doubt that the canker-worm is more than forty miles from the seacoast in this State.

Mr. IVES. I was very glad to hear Mr. Clement speak of the Early Sweet Bough. I consider that the best early sweet apple we are cultivating. The number of synonyms that apple has shows its value. After having had that apple in my grounds for a number of years, and found it very fine indeed, I went into New Hampshire, and a man told me he had a sweet apple that surpassed everything. He described it as very large and fine indeed. He called it the Washington Sweeting; but when I came to compare it with the Early Sweet Bough, I found it the same.

Mr. DODGE. I know of no tree that is so exempt from the ravages of insects and the other drawbacks that attend the plum, the cherry and the peach, as the pear-tree. It has a leaf that hardly anything will take, except the web-worm, and that is easily managed in the fall of the year. These drawbacks seem to increase as the cultivation of trees extends. No doubt a great many of these insects and diseases we have imported with our trees; but here we have them, and a great many men feel disheartened, and are ready to sit down and fold their hands and give up, but I do not think that is the right doctrine. I think the true principle is, the more of these obstacles we have, the more we should be on the alert to fight them in every way and shape. Take, for instance, the canker-worm. It has been more or less in my region for many years. It appears sometimes almost periodically. I don't believe in the theory that it comes once in seven years. We can show accounts of it in this region for two-thirds of a century, and I don't know but it goes back further. It behaves very strangely. We had it in our neighborhood a few years ago, and in part of the town it was on one side of the road and not on the other. It will go into an orchard and take the grafted fruit and leave the ungrafted. Well, the canker-worm came to us in great abundance, perhaps ten years ago, and my neighbors generally neglected it for a year or two, and then gave up in despair. The moment I saw them, (I had heard of them before,) I fought them hard. I bought some tarred paper and tied it around my trees, six, eight or ten inches wide, according to the size of the tree, tarred the upper part, and let the tar drip down and catch on the rope that the paper was tied with. I followed this up in the fall and winter, and never had my trees eaten badly. I always caught enough of the worms to prevent their increasing, and had fruit all the time. I saved my crops by persistency, by the determination to save them. I followed it up. The question is, will it pay to follow it up? Every man must judge for himself. I think it will. I believe the crops of apples for the last two or three years have paid the cultivator for his trouble. I have been paid. I had twenty-five or thirty barrels this year; they paid me well. So with pear trees, and every other tree that a man thinks it worth while to cultivate. Be vigilant, take time by the forelock, and keep the enemy down. I love fruit culture so much that I would willingly do almost anything. Had I been Adam, when the command was given not to eat the forbidden fruit, I would have kept that command, if for no other reason, for the sake of staying in the garden. I think that to live in a garden is next to living in heaven. I don't know as I should have liked to sit down and eat the fruit and smell the flowers without doing any work. I think if I was to live in a fruit garden I should want to work.

Mr. IVES. There is one consolation in regard to the canker-worm: we may live to see the time when we shall not see one. Twenty-five years ago, the rose-bug was so prevalent that it used to enter the grape-houses. I have not seen one for years. There is the army worm, which made such terrible havoc—we do not see many of them now. I have heard but little complaint of late years of the onion-worm. But the thing that is the most fearful is the attack of something that you do not know. Take the plum-tree. I had some forty odd varieties. I wanted to kill the curculio. I bought six hogsheads of salt and put it on one acre of land in the month of March, and I had the greatest crop of plums that year that was ever seen in this part of the country. But these excresences that come upon the plum-tree, we cannot find out what they are. When this excresence first comes, it is about the consistency of cheese. I have dissected it a number of times, and I could never find an insect in it until it got to be wood. All I can say is, it is the want of something in the soil that produces that, but what it is I cannot tell. It is involved in mystery to this moment. Nobody can explain the cause of these excresences. I took a great deal of pains to ascertain whether they are natural to the plum. I found them on the Plum Island plum, which satisfied me that they belong to the original plum. I think this thing was not known some years ago in New York; and, indeed, twenty-five years ago, the curculio was hardly known.

Mr. HARRINGTON. I was called into a gentleman's orchard this fall, and was astonished to see his trees loaded with the Williams, the Gravenstein, the Porter, the Baldwin, the Minister, the Russet, the Rhode Island Greening, the Spitzenberg; while his neighbor, to whom he had leased two acres of the same piece of ground, had no apples on his trees at all. The gentleman of whom I speak was offered sixty dollars for the fruit on one of his Minister trees, and refused to take it. I asked him how it happened that there was such a difference between his trees and those of his neighbor, on the adjoining land, with only a stake put down between them, on the same soil. He said: "I have taken care of these trees, and he has taken no care of those. For twelve years I have persevered and taken care of my trees, and now I am amply rewarded for my twelve years' patience." He took from three acres and a half about

$1,800 worth of apples. He sold a bushel of Williams apples for ten dollars—109 apples. His Porter apples he got five dollars a bushel for; and for the Gravenstein and Hubbardston Nonesuch he got astonishing prices. Mr. Dodge is correct. Perseverance will save your fruit. There is the evidence of it. People came from all the villages round and said: "Well, Captain Pierce, you have got more apples on your three acres than we have got in our whole town." They were astonished. His neighbor had trees that blossomed, and the fruit apparently set, but the apples dropped off, and he did not have a barrel on the whole of his ground. Nothing of that sort occurred with Captain Pierce's trees. In addition to his apples, he raised twenty bushels of Bartletts and about twenty tons of marrow squashes on his three and a half acres.

Professor CHADBOURNE. It is said that one gentleman had his young fruit set well, but after a time, they all dropped off. That was very generally the case in our part of the State. I never saw apple trees blossom so well, I think, as they did this year. The fruit set and grew to the size of grapes,—some large and some small grapes,—and then the great mass of it fell off, so that you might say, we had no crop at all. I tried to ascertain the reason of this, and I found that certain trees back of my house, that are in comparatively damp, rich soil (you may say, the trees that are well taken care of,) retained their fruit; and they gave me all the fruit I had this fall, which was very little. All the trees on dry land lost their fruit. I have been disposed to attribute it to this fact. Everybody who knows anything about the habits of trees knows that after they have put out their leaves, made their wood, and set their fruit, they not only set buds for the next year, but they store up in their tissues the nutriment for the next year's growth; and I have been disposed to think that in the seasons of drought we have had, these trees were unable to gather up nutriment for the next year, and after the buds set, this great crop of fruit made such drafts upon the tree that there was not nutriment enough to support them, and they fell off. And I infer so from the fact, that those trees in damp soil in my garden, where they could store up nutriment, gave me good crops. I have made inquiries of Mr. Letherbee in regard to this matter, and find that his observation is the same. I mention these facts to see if we can have any light upon that point, because it is a very interesting one.

Dr. NICHOLS. I have an orchard of four or five hundred apple trees, and my last year's experience corresponds with that of Professor Chadbourne. A portion of my trees are on the side of a hill, running up to its apex, while upon the other side they extend down to lower ground. All the apples I had this year were from the trees in the lower ground. I think the Professor's views are very ingenious, and worthy of investigation.

Mr. STOCKBRIDGE. My experience is directly opposite. I know of an apple orchard planted upon a dry, sandy loam, where, of course, special pains were taken in planting it, but the nature of the soil was not changed. The orchard was well manured, it has now come into bearing, and the trees have been overburdened with fruit this year.

Professor CHADBOURNE. That is not at all satisfactory. If that soil was in such condition during that time that the trees could find the proper amount of nutriment, then the conditions that I have referred to existed. I understand that the land to which Mr. Harrington referred was properly cultivated, and peculiarly fitted to the apple.

Mr. HARRINGTON. It was all cultivated. There was no portion of the soil that was not cultivated. It was all covered; you would not have supposed there was a particle of soil there. I found afterwards that his son-in-law, who lives about a hundred rods off, in a sand-bank, had done the same thing. He succeeded in getting fruit this year, when all his neighbors failed. The soil was precisely alike—all dry, sandy soil. There could have been no moisture there last year or year before last. And they mulched their trees alike. They both raised squashes in their orchards.

Mr. BILLINGS. I was told by that son-in-law, that the main thing in making his trees so productive was, that he expended a good deal of money for meadow hay, and mulched all round his trees, especially his Williams trees, for which he got ten dollars a bushel. He puts meadow hay under these trees for the sake of preserving his Williams apples when they fall.

The question was asked if the canker-worm has extended more than twenty miles from the seaboard. Mr. Clement has told us that Mr. Reed, of Westford, says his apples cost him ten cents apiece, in consequence of his having to fight the canker-worm. I have understood that Mr. Reed takes the same course that Captain Pierce does. He buys all the meadow hay he can get hold of for the purpose of putting it under his trees. It prevents the growth of vegetation, keeps the ground moist, and at the same time makes a bed for the falling fruit. I believe that is the true secret of the success of those trees. I think the mulching is beneficial in keeping down the canker-worm. I believe the great thing to be done to secure success in raising fruit is to keep everything else back. You cannot have your cake and eat it too. You cannot raise two things on one piece of ground. If a man is going to raise fruit, he must give up his land to that object. The idea of raising grass in an orchard, or grain, or potatoes, or anything else, I do not believe in. If a man wishes to get a crop of fruit, he must give up his land to that crop. I believe the mulching of those trees is the main reason why they bore so large a crop.

Adjourned to 7½ o'clock, P. M.

EVENING SESSION.

The Board met again agreeably to adjournment, to hear a lecture on

WHAT CHEMISTRY HAS ACCOMPLISHED FOR AGRICULTURE.

BY JAMES R. NICHOLS, M. D.

The inquiries frequently made by those interested in practical husbandry, are such as assume the unsettled aspect of several most interesting and important questions:—"Is there reasonable grounds for hope that science will ever prove of practical benefit to agriculture?" "Will chemists ever furnish us reliable assistance in the fertilization of our fields?" Questions of this nature very naturally suggest others proper to ask, and which I will endeavor to answer, before considering whether the assumptions of the former are founded in fact or not. The most prominent one is "What *has* Chemistry accomplished for Agriculture?" This inquiry will form the main topic for discussion this evening. I fear if a response was demanded without discussion, it would not be very flattering to science; and, therefore, I am unwilling to jeopardize so important a decision without full and fair debate. As farmers, we have a most direct and practical way in making and shaping our demands upon science. These demands may be exacting, or, perhaps, a little provoking to the toilers in the laboratory, but, after all, they do not seem to involve anything very unreasonable. The resources of science appear to be adequate to meet any demands, or sufficient for any emergency.

If we place in the hands of the chemist a mineral substance, with the view of ascertaining its exact composition or industrial value, we think we have a right to obtain explicit answers to our inquiries, and, indeed, we know the chemist is able and expects to answer them. And also, if we submit specimens of our soils, plants, roots, seeds, &c., we know if we are in the hands of a true man of science we shall receive exact, reliable responses to all our inquiries. As regards the soils, we receive written statements giving the amount of passive or mechanical agents, the sand, clay and gravel; also, the organic and mineral constituents, humus, nitrates, ammoniacal salts, the potassa, soda, lime, &c., &c. These, in quantity, are all stated with marvellous precision, and while, perhaps, amazed at the skill of the manipulator, we are not inclined to question his results. The seeds of the maize plants, the roots and the grasses, come back to us separated into their ultimate or proximate constituents, and the materials which enter into their structure are exactly stated.

These palpable results are well calculated to inspire hope and confidence, and lead us to ask, "Why cannot the exercise of the same scientific skill afford precise directions how to dress and fertilize our fields that we may obtain the maximum or highest results of our labors?" Why cannot the chemist inform us how much wheat, corn or barley any soil will produce, and, also, the kind and how much fertilizing material is needed to the acre?

What is known, or presumed to have been accomplished in this direction, leads many soil-cultivators to conclude that these desirable ends have not been reached, and much doubt is expressed as regards their attainment in the future. A considerable amount of ridicule has been cast upon chemistry as applied to agriculture, and, generally, its teachings have not been carefully and intelligently studied and carried into practical effect upon the farm. Conductors and correspondents of agricultural journals, and writers of popular works upon husbandry, have shared to some extent in this distrust of the teachings of science as applied to agriculture.

A sharp writer in one of our most respectable agricultural journals remarks, at the close of a long article upon the subject, that "scientific agriculture stands to-day with *phrenology* and *biology* and *magnetism*." "No farmer," he says, "ever yet received any benefit from an analysis of the soil, and it is doubtful if any one ever will." The author of a very popular agricultural book declares, "There is no more a chemistry of agriculture than there is a chemistry of horse-flesh or a conchology of egg-shells. Chemistry may be an aid to agriculture; and so are wet weather, and a good hoe, and grub, and common sense. Chemistry is an exact science, and agriculture is an experimental art, and always will be, until rains stop, and bread grows fully baked."

It is evidently required of chemistry by many that it accomplish for agriculture what it has for medicine or the industrial arts, or what mathematical science has for astronomy. As by the laws of motion of the heavenly bodies eclipses are calculated, and occultation of stars foretold with mathematical precision, so chemistry must be definite, precise and practical in its teachings relating to agriculture, and direct how to fertilize a field, and cause two blades of grass to grow where but one grew before.

Leaving the further consideration of this point for the present, let us return to the question, "What has chemistry accomplished for agriculture?" And *first*, what has it taught regarding the composition of, and the benefits resulting from the use of, barn-yard manures? *Second*, what regarding *special* fertilizing materials? I shall dwell more particularly upon the latter inquiry, as from a somewhat extended practical experience in the use of many special fertilizers, especially bones, a wish has been expressed to learn the results of these experiments.

The dark heaps of animal excrement which lie about the barn-yards of farmers, have, during all ages, been known to possess specific fertilizing influence upon plants; and if it were furnished in sufficient quantities to replace the elements removed from soils in repeated croppings, the labors of chemists in the direction of seeking out new supplies of plant-food would be practically aimless and absurd. But this is not the case. The exhaustive process is continuous in all civilized communities, and it is impossible, in densely peopled sections, to maintain a satisfactory balance between supply and demand.

It was very natural, then, that early in the history of chemistry as an exact science, it should be called to the investigation and determination of the chemical nature of that material, which common observation and experience had taught to possess the natural food of plants. As regards its superlative value, no one has ever entertained a doubt, either before or since the field of chemical investigation was fairly opened. What is its composition? Allow me to present the results of some determinations of my own on this point. A parcel obtained from the yard of a neighbor, which, under the conditions in which it was produced and preserved, may be regarded as a fair representative of the article as furnished by ordinary farmers, gave the following results: A portion weighing 7,280 grains was carefully dried in a porcelain dish over a water-bath, and it was found to lose of water 5,960 grains, leaving of dry matter 1,320 grains. Of the residuüm thus freed from moisture, 455 grains were placed in a platinum capsule and carefully ignited, thus removing the combustible or carbonaceous matter made up of the elements—oxygen, hydrogen and carbon. The resultant ash weighed 177 grains, showing a loss of volatile or combustible elements amounting to 278 grains. In order that the results of the analysis may be clearly understood, it may be desirable to present them without regard to fractional parts, and to estimate by the whole amount experimented with, viz., 7,280 grains. This amount gave of water, 5,960 grains; combustible or carbonaceous matter, 806; nitrogen, 29; potash and soda, 41; lime, 43; magnesia, 14; phosphoric acid, 15; sulphuric acid, 11; chlorine, 14; silicon or sand, 335; oxide of iron and alumina, 22. The points in this examination which will doubtless appear most striking, are the large amounts of worthless material which constitute the bulk of barn-yard manure, the water and sand greatly predominating over everything else.

A better idea of this may be obtained if the results of the analysis are applied to a larger amount of manure, which will give the constituents in pounds. Assuming that a cord of ordinary barn-yard manure will weigh 3,000 pounds, its actual value as a fertilizer may be presented as follows: There are contained in it of water, 2,456 pounds; common sand, 138 pounds. These added together give 2,594 pounds of perfectly worthless substances. Now, if we still further subtract the carbonaceous matter, 332 pounds, which is of no more value than muck, peat, straw or chaff, we have left only 74 pounds of active fertilizing material which has a money value. To obtain this 74 pounds, which really is all that is valuable, the farmer loads and hauls upon his field 3,000 pounds, or one and a half tons of a compound in which there is water enough to do the weekly washing of a small neighborhood, and a sufficiency of sand to keep the kitchen floor tidy for a month. The 74 pounds of mineral salts might be taken in an ordinary bushel-basket, and carried upon the shoulder to any point desired. In this amount there is the nitrogen, potash, soda, lime, magnesia, phosphoric acid, sulphuric acid, chlorine, iron and alum. In estimating the market value of these substances, we may obtain the nitrogen by the use of crude nitrate of soda or sulphate of ammonia, at a cost of $2.60; the potash, soda, &c., in one and one-half bushels of good wood ashes, at 35 cents, and fifteen pounds of common salt, ten pounds of bone-dust, three pounds of gypsum will supply the remaining constituents, at a cost of fifty cents. If we estimate the carbonaceous matter at ten cents, we have, as the actual cash value of all that promotes plant-growth in 3,000 pounds of barn-yard manure, the sum of $3.35. There are but few localities where the farmer can purchase manure at less than $7.00 the cord; and when to this we add the expense of hauling and applying to fields, we find there is a wide margin between the cost of the isolated valuable constituents of manure, and the article as furnished in its natural condition. Barn-yard manure may be imitated by thoroughly composting with a cord of seasoned meadow muck sixty-five pounds of crude nitrate of soda, two bushels of wood ashes, one peck of common salt, ten pounds of fine bone meal, two quarts of plaster and ten pounds of epsom salts. The cost of this compost will not be over $3.50 the cord, and ought, other things being equal, to serve as good purpose in the field. In practical trials of this mixture I have found that while it serves a most admirable end, giving very satisfactory results, it does not act so rapidly and energetically as manure; but its effects are more lasting. In short, the same salts and organic matter as found in the dung-heap, have a higher money value, and seem to exert a more specific influence upon plants, than when presented in artificial mixtures. By substituting nitrate of potassa, or saltpetre, for soda, the compost is greatly improved, while its cost is enhanced. If the salts are dissolved in water,—those that are soluble,—and the bone in ley, and good muck is employed, a compost is formed very nearly as valuable as seasoned excrement. Very nearly, we have said—why is it not of equal value?

We have reason to believe it is owing to a minuteness of the subdivision of atoms, which we can neither produce nor comprehend,—a degree of comminution which sets at defiance all mechanical and chemical manipulation. Beside this, there is, however, a peculiar condition arising from, or communicated by, the contact of vital forces, which science is incapable of explaining. A physician once brought to me a jar of ox's blood, with the request that I would extract or isolate the metal iron therefrom, and place it in his hands. In answer to inquires as regards its uses, he stated he wished to employ it as a thereapeutic agent, under the impression that iron once assimulated would have a higher and more natural influence when passed again through the animal economy, than the usual forms of the metal from other sources. His hypothesis was undoubtedly correct, and while it was quite within the power of chemistry to isolate the iron from the blood, it was impossible to secure it in the *condition* in which it existed in that fluid. That condition is indeed a peculiar one, and its presence is not indicated by any of the usual chemical re-agents. If we applied to it simply the usual manipulating processes, chemistry would fail to show that there was an atom of iron present in the blood of men or animals. This may illustrate the difference between the fertilizing influence of metals and salts, as found in animal excrement and as existing in other, or the usual forms. The iron as found in the blood, if administered to an enemic patient, would without doubt immediately, and by direct and easy processes, again pass to its appropriate place, and restore the sanguineous fluid promptly to its normal condition.

But chemistry can never furnish it in that form, neither can it supply the mineral constituents required by plants, precisely as found in manures; but this must not lead us to disparage science and reject its teachings. We will accept what it does teach with sincere thankfulness. We will use as a medicine the best forms of iron it suggests, and they are many and of great efficacy; we will employ those fertilizing agents which it has pointed out as possessed of merit, and they, also, are many.

The impression entertained by some that chemists underrate and disparage barn-yard manure, is an erroneous one. It has no foundation in fact. They labor to multiply sources of this material, and the most important service rendered by it to the farmer is in the methods it points out whereby it is economized, and its efficacy preserved. In this particular, chemistry has accomplished much for agriculture. Would that soil-cultivators gave heed to its suggestions; then, indeed, would there be less demand for other agents.

But, secondly, let us consider what it has done in the way of furnishing a supply of these. Here we find the evidences of the exercise of a wonderful intelligence and industry,—a persistent scientific labor hardly excelled in any other field of research. It has analyzed and demonstrated the great value of decayed vegetable matter, as peat or muck; and given reliable directions how to fit it for manurial uses. There is scarcely a substance upon the land or in the sea that has not been made the subject of careful examination, with the view of ascertaining if it contained those principles capable of nourishing plants. As the results of these labors, we have a class of substances which, in contradistinction from animal excrement, or barn-yard manure, are called "special" or "chemical" fertilizers. Perhaps no article of the class has received more attention in this country and in Europe, than bones, and they have become a standard article of commerce. They are presented in the natural condition, as found in animals, or in that of a powder of variable fineness. Dissolved in acids, before or after calcination, they are called "superphosphates," and in this form are largely employed in agriculture. The term "superphosphate" is a popular one, and advantage is taken of this to palm off upon unsuspecting farmers all conceivable compounds of meadow-muck, human excrement, blubber and fish oil, gypsum and charcoal, as the genuine article.

I had the curiosity, recently, to inquire of a most excellent farmer friend what was contained in some suspicious looking barrels which had been rolled into his yard. "Superphosphate," he replied. "Ah, superphoshate of lime, I suppose, for your corn-field." "O no, I think not," said he, "it is *genuine* superphosphate, and no *lime* is mixed with it." I expressed the opinion that he was probably correct; that the mixture was innocent of lime, as found associated with phosphoric acid in bony structures, and yet it was a little puzzling to know how it could be "genuine superphosphate."

Superphosphate of lime, or that compound formed by dissolving finely ground bones in sulphuric acid, is a most excellent fertilizer. There is scarcely any land in New England that will not under its use, render highly remunerative returns, but we cannot depend upon manufacturers for it. Every farmer must make it upon his own premises, and I insist, that it can be produced readily, safely, cheaply. Let me present to you the method which I adopt upon my own farm premises.

Take a common sound molasses cask, divide in the middle with a saw, into one-half of this, place half a barrel of *finely* ground bone, and moisten it with two buckets of water, using a hoe in mixing. Have ready a carboy of oil of vitriol, and a stone pitcher holding one gallon. Turn out this full of the acid, and gradually add it to the bone, constantly stirring. As soon as effervescence subsides, fill it again with acid and add as before; allow it to remain over night, and in the morning, repeat the operation, adding two more gallons of acid. When the mass is quiet, add about two gallons more of water, and then gradually mix the remaining half barrel of bone, and allow it to rest. The next day it may be spread upon a floor where it will dry speedily if the weather is warm. A barrel of good loam may be mixed with it in drying. It may be beaten fine with a mallet or ground in a plaster mill. If several casks are used, two men can prepare a ton of excellent superphosphate after this method, in a day's time. It affords a prompt fertilizing influence, especially upon root crops, even when employed alone. Much less acid is used in this formula than is demanded to accomplish perfect decomposition of the bones; but it is important to guard against the possibility of any free sulphuric acid in the mass.

Another most excellent method of preparing bones for field use, is to dissolve or saponify the gelatinous portion by the employment of caustic alkalies. For this purpose, take 100 pounds, beaten into as small fragments as possible, pack them in a tight cask or box with 100 pounds of good wood ashes. Mix with the ashes before packing, 25 pounds of slaked lime, and 12 pounds of sal soda, powdered fine. It will require about 20 gallons of water to saturate the mass, but more may be added from time to time to maintain moisture. In two or three weeks the bones will be broken down completely, and the whole turned out upon a floor, mixed with two bushels of dry peat or good soil, and after drying it is fit for use.

This mixture, embracing nearly or quite all the great essentials of plant food, is one which in its application, will afford most prompt and satisfactory results. Its production cannot be too highly recommended.

The employment of bones in their raw condition after grinding, has not generally been attended with results entirely satisfactory. Notwithstanding the published recommendations and testimonials, the fact remains, that the general verdict is not in their favor. My experience in the employment of this form of fertilizing material, has been considerable, having used many tons during the past four years. Chemical analysis of corn and wheat, taken in connection with that of bones, would seem to show that they do not contain a sufficiency of the nitrogenous element to render them specifically beneficial to those cereals. And I have found in practical trials that they often exert but indifferent influence upon corn and wheat, when used uncombined or in a raw condition. This is especially true of steamed bones, where a portion of the gelatine has been removed in the manipulating process. When specifically employed upon soils appropriated to corn or other grain crops, failures either partial or complete, have been often experienced; but upon those designed for roots, or some varieties of vegetables, success is uniformly certain.

Bones are made up of an earthy tissue of fine cells, in which an organic substance—gelatine—is inclosed. The gelatine holds the nitrogen, and undergoes putrefactive change, when moistened with water, with access of air. Ground bones undergo no change when air and moisture are excluded, and without this the powder is no more fitted or adapted for plant-food than pebble-stones or powdered glass. The putrefactive fermentation is attended with a copious evolution of heat; new bodies are formed, and disintegration of the structure takes place. The earthy constituents are composed principally of phosphate of lime. The best specimens I have met with, gave, approximatively, of animal material and water 35 per cent.; phosphoric acid earths, 47 per cent.; carbonate of lime, silica, &c., 18 per cent. A direct estimation of the nitrogen, gave, in 1,000 pounds, of bones, 50 pounds; of phosphoric acid, 240 pounds; of lime, 330 pounds. Hence we find they afford about 20 per cent. of nitrogen in their fresh condition. The phosphoric acid, however, greatly preponderates. Of this they furnish a rich supply.

In carefully studying the causes of failure of bones, when applied to the production of the cereal grains, it is evident we cannot *always* attribute it to want of the nitrogenous principle, as in addition to what it is capable of furnishing, other sources of supply often exist in the soil fully capable of meeting deficiencies.

In considering some general causes which operate to prevent full and legitimate good results following the application of bones to soils, we shall see that the method or form of employment may have much to do with such failures. Adverse influences may be due, first, to adulteration in the bone material; second, the want of proper preparation before applying to the soil; third, unfavorable seasons. The first is an evil of very great magnitude, and one which can and ought to be abated. Every dollar accumulated by the industrious farmer is usually earned by the sweat of the brow, and he ought, particularly, to be exempt from peculation and fraud. Pulverized oyster and clam-shells, mixed so largely with bone-dust by some manufacturers, exhibit a form of dishonesty particularly reprehensible, and are a source of great loss and disappointment to the husbandman. It is pleasing to know that all mill men do not practise this fraud.

The want of proper preparation is a fruitful source of failure. Bone-dust ought always to be composted or rotted before using.

It should be layered with good muck or soil, and kept moist until thorough decomposition results, and then it is fitted for the field. A gill of dry bone-powder, placed in the opening prepared for a hill of corn, and covered with moist earth, heats rapidly; and I have found that in forty-eight hours a thermometer with the bulb buried in the mass indicates a temperature of 112° Fahrenheit.

This temperature is fatal to the germination of seeds, and beside the formation of caustic ammonia by the putrefactive change of the gelatine, furnishes an agent, when in excess and direct contact, equally as destructive as heat. Hence we learn why corn and other grains sometimes not only fail to flourish under its influence, but are absolutely destroyed in the germ. This heating, decomposing process should be effected prior to placing it in contact with seeds. The peat or soil used in connection with it effectively absorbs all ammoniacal and gaseous products, and holds them firmly, until abstracted by the fibres of the plant-roots in search of aliment.

This is not the time or place to present details of observations and experiments with bones or other fertilizers. In fact, there is much that is strictly empyrical in such statements; they are entangled with so many modifying and distracting circumstances that they possess but little value.

The experimental labors undertaken upon my own farm have led me to adopt certain general conclusions as respects the teachings of chemistry and methods of employment of special fertilizers, which will be stated before I close. I have employed in these experiments a great variety of substances, under all possible forms and conditions, and have had regard to hygrometric and thermometric influences.

The analysis of soils constituted a prominent part of the labor, and it was in this direction that I expected chemistry would furnish most important aids.

It was soon apparent that but imperfect guidance was to be afforded by these analyses, however carefully conducted. In fact, the very perfection of the results, the exhaustive nature of the processes, created confusion and doubt, inasmuch as they revealed the presence of elements amply sufficient to meet the wants of plants; and yet they would not flourish in those soils.

Chemical reagents make palpable that which vital processes cannot force from their hiding-places. Acids dissolve hard and refractory substances; the tender spongioles of plants can only seize and appropriate those which are already in a state of solution. Hence, chemical research may demonstrate the presence in any given soil of the different forms of food which they require; but if the experimenter authoritatively announces to the farmer that it is fertile and capable of bearing crops, he is in danger of incurring contempt and ridicule, as practical trial disproves his science and his statements. The elements of fertility must not only be present in a soil, but they must exist in an assimilable form. To determine the presence and amount of the useful substances is not enough; research must proceed further, and declare the *condition* in which they exist. There is very great liability to be misled in analyses of this character, and chemistry has failed to afford much practical aid to husbandmen in this direction.

I have found that soils holding but very disproportionate quantities of those elements which a particular crop required, would nevertheless produce it in fair abundance. I have to confess to disappointment to false predictions of results in some special instances, and until the true explanation presented itself to my mind, the matter of chemical research in soil analysis was under a cloud.

What was the explanation? Why, simply this: the soil, although holding the substance sparsely, yet all of it was in an assimilable condition; and as there was enough to meet the wants of a single crop, it was sought out and appropriated.

If the same crop had been repeated the succeeding year, it would have been very nearly or quite a failure. So long as chemical analysis of soils is inadequate to inform us respecting the condition, or how much of the contained plant-food is in a soluble state as required by vegetable organisms, it will be impossible to make any certain predictions regarding its immediate or remote productiveness. Analysis must not on this account be discarded as useless or unprofitable in its teaching, as by its aid a vast number of significant facts have been developed, and many positive principles educed. A soil found to contain none of the constituents which plants require could with safety be pronounced barren; and if there was an utter deficiency of any one essential, like phosphoric acid, lime or potash, it could with equal safety be declared incompetent to support a certain variety of vegetation. Analysis fails to determine the positive immediate fertility of a soil, as we cannot determine how much material is in an assimilable condition. Viewing the matter as I do, it is not often necessary to resort to this expensive mode of inquiry. As will be shown, we can fertilize understandingly by chemical aids which do not pertain to the department of analysis. Chemistry not only unfolds the precise nature of soils, but also, as we have seen, the substances and principles which enter into plant structure.

The relations between the two are such, we are certain, the inorganic matter found in the latter must have existed in the former. If there were no interfering agencies beyond our guidance, the whole problem of vegetable growth would be apparently the simple one of demand and supply, and this we could control.

It is an axiom which admits of no dispute or contradiction, that all the plant consumes of a mineral character comes from the soil. Let us consider for a moment the character of some grains—*wheat*, for example.

If we make chemical examination of wheat, we find that what we are able to rub off from the kernels, after moistening, with a coarse towel, is made up of woody fibre, and differs but little from the dry straw of the plant. The next wrapper, which is a continuous one, contains the most important constituents of the seed, holding the phosphate salts, and the nitrogenous ingredients. Here is stored up the little atoms of phosphate of lime, magnesia, soda and potassa, which the microscopic mouths of the root fibres have sucked from the soil in which it grew. The office of the plant has been one simply of transference ; it has transferred from the soil the earthy particles—lifted them from their low estate, to the highest within its power to attain,—placed them in position to meet the requirements of men and animals. Now, can the plant grow, and the seeds mature, unless the soil contains these salts ? It may grow, and even luxuriantly ; but shrivelled and imperfect seeds, few in number, will occupy the little pockets in the head, where under the nourishing influence of a properly adjusted soil, the grains would round out with that plumpness that causeth the husbandman to rejoice.

It follows then, that phosphoric acid is needful for the proper development of wheat seeds,—and moreover, as the gluten which holds the salts is rich in nitrogen, that element is essential to its growth. These truths are a part of those which chemistry reveals to us, respecting the constitution of the wheat berry. New England soils are deficient in these elements. Lime and the phosphates were never stored up in them in abundance, and through the successive croppings carried on by our fathers, men and animals have absorbed into their bony frameworks, the little which had accumulated during the ages. The inference which seems to follow from these considerations is, that we have only to supply soil deficiencies, sow our wheat, and casting aside all doubt and anxiety, patiently await the abundant harvest.

And why should we not do this ? Have we not solved all necessary problems ? Have we not learned by analysis what food is wanted and have we not furnished it ? Have we not learned precisely the constitution of the vegetable structure, and its seeds ? Do we not understand the nature of its appetite, and how it must be fed ? Certainly we do. Why then should we meet with failures ? Because, we cannot bring under control all the conditions of vegetable growth. We could better command success, were there no uncontrollable influences to be taken into account. The chemist cannot order meteorological agencies. He finds in his examination of plants, that they contain an abundance of water, and he also learns, that vast quantities are constantly being exhaled during growth, and still another most important fact stands out for recognition : the food he supplies, must be soluble in water, and by its agency, voyaged through the microscopic canals to its appropriate resting place. Water, then, is needful for perfect development of plants and seeds. Heat also must be supplied. The clouds must let drop the rain, and solar rays supply the diffusive warmth, else the husbandman returns from his harvests in sorrow, and science fails to aid him. Let us not unjustly condemn its teachings, because it is unable to control the caprices of the seasons.

It is seldom however, that crops utterly fail from the withholding of heat and moisture. Our fields are lean because of starvation, because we do not supply through the soil, the food which plants require.

Chemistry teaches what had already been learned from observation and experience, that in feeding vegetable growths, the kind of aliment demanded differs in different organisms. There are certain great families of plants which have diversified appetites, and they must be gratified in their tastes or they refuse to bring forth their like. We know what they require, and we obtain hints as regards the best method of supplying their wants.

It is safe to follow the guidance of chemistry in fertilizing trees and vines. Careful examination of the wood and fruit shows what substances they most largely consume.

They differ from grains and roots not so much in the food they require, as in circumstance of condition. They are placed in the soil to remain for a series of years, and the consumption of certain elements is to be gradual but constant. Therefore it is better to supply generously the specific aliment they require, and trust to soil decomposition for those articles of which the structure needs but a trace.

About twenty months since, I prepared a grape border sufficiently large for thirty vines. It was arranged in strict accordance with the chemical structure of the vine and fruit. Lime, phosphoric acid, potash, predominate in these, therefore to meet the first want, mortar from the walls of an old building was used; for the second, well rotted bone-dust; for the third, ashes. But little animal excrement was employed, decayed sods supplying the needed humus.

Entertaining the idea that it is better not to make a homogeneous mixture of border materials, they were arranged in very thin strata or layers; first of soil, then bone, then soil with sand, then ashes, soil and sand again, then lime. The layers constituted but a mere sprinkling, and due regard was had to requisite quanties of each.

This bed was not disturbed with the shovel after it was completed. Arranged in this way, it seemed reasonable to suppose the roots would not be required to travel so far for food in the early stages of growth, and that extending as the supply failed, they would meet with a constant supply of nourishment. A kind of vegetable instinct evidently controls the feeders to plants, and enough push out to secure each distinct element in exact proportion to its wants; and the less the distance they travel, the less the vital force consumed in urging onward the nutritious principle.

The growth of wood the first season was strong and vigorous, and that of the past summer so extraordinary, that I had the curiosity to collect the wood that pushed out and matured from single buds and weigh it, and the amount was found to be one hundred and seven pounds. Analysis of a portion of the leading shoot from one of the vines, basing the estimates upon ten gramms, the amount employed in the examination, gave as the quantity of water held in association sixty-one pounds; combustible matter, forty-four and a half; *ash*, one and a half pounds. The ash contained of potassa, twenty-nine parts in the hundred; phosphate of lime, nineteen; carbonate, thirteen; soda, three; magnesia, four, and small quantities of iron, silex, &c. The parts are given in round numbers, as for the purposes had in view scientific accuracy of statement is unnecessary. The wood, therefore, cut away at the fall pruning carried off nearly eight ounces of potash, more than five ounces of phosphate of lime, and of lime and carbonic acid nearly four ounces. The subtle chemical agencies at work in the soil to render soluble and digestible so large amounts of mineral salts, how difficult to comprehend! and then how amazing the amount of mechanical force exhibited by the vines starting from tender buds, capable of sustaining at maturity more than sixty pounds of water, and keeping it in motion through the pores.

It is fairly to be inferred from the results of this experiment that the luxuriant and healthy growth was due to the generous supply of food precisely adapted to the wants of the vine, and that the teachings of chemistry, as relating to the structure and appetite of vines, are worthy of regard.

What course is obviously to be taken when from repeated croppings the grape clusters fail to appear? Shall we tear up our vines, as do many, and entirely remove the contents of the border as waste matter, and at much expense form a new one? Drenching with farm-yard manure from year to year has failed to restore to full fruitfulness; and why? Because it does not furnish in sufficient abundance the *one*, or, perhaps, *two* substances which are imperatively demanded. Contemplate for a moment the very large amount of *potash* stored up in the vines and fruit, greater even in the latter than the former, and is there not palpable significance in this fact which chemistry unfolds?

Unleached ashes, applied in generous quantity to old grape-borders, will usually restore them to full fruitfulness, and render removal unnecessary. If they falter after the application, add finely ground bones, and the work is done. The other agents needed are usually present in the border in sufficient quantity to meet all requirements, and it is only necessary to add those which have been removed by absorbtion to effect complete restoration.

If we can be as safely guided by the teachings of chemistry in the cultivation of the three great families of plants upon which agricultural industry is most exercised, the cereals, leguminous plants and roots, we shall be directed by a light which will lead us out of all errors and all difficulties.

A recent English writer, in speaking of the results of the labors of Professor Ville, of the imperial farm at Vincennes, in the exuberance of his enthusiasm, exclaims, "There is nothing extravagent in stating that light has replaced darkness, that order has succeeded to chaos, and that the phantom of sterility is laid." Without sharing in such positive convictions in regard to the labors of the French experimenter, it is impossible to doubt or question the importance of his investigations. Indeed, in their general character, they can hardly be regarded as very new or novel, but they strike a death-blow at one delusion, which, like a spectre, has haunted chemists in their teachings upon agricultural questions for many years.

This relates to the empyrical, indiscriminate application of single fertilizing substances to soils without any definite object in view. Perhaps the term "running for luck" will express the idea. The teachings of Sir Humphrey Davy, Liebig, Johnstone, Way, and many others, it must be confessed, have led in this direction, and thus established the uncertainty which invests such experimenting. The literature of agriculture is almost corrupted by disquisitions upon, and recommendations of, various salts or substances, as being the long sought-for elixir vitæ, the great specific, which is to retrieve all lands from barrenness.

No fact is more apparent than that no such specific exists. The recommendations of salt, lime, iron, nitre, ammoniacal salts, and a dozen other specifics, in our numerous excellent and useful agricultural papers, cannot be regarded as beneficial to agriculture. It is quite natural for a soil cultivator, when, in the course of a series of experiments, he hits upon an article peculiarly adapted to the condition of his soil, to desire to communicate to others a knowledge of what has been so beneficial to him. The motives are honorable and praiseworthy, but he may thereby lead a neighbor into trying an experiment which ends in utter failure; and not only this, may do harm, by creating prejudice against that which, under a change of circumstances, might prove exceedingly useful. It will be understood that these remarks are made against the empyrical use of single fertilizing substances. If any one has time, and inclines to experiment for his amusement, no harm can result, provided it be understood that the field of knowledge cannot be greatly extended by such labors, and that no observed beneficial results are of much use, except to the experimenter.

Perhaps gypsum may form an exception to these remarks. Because of its peculiarly isolated character, and of the uncertainty of its mode of fertilization, it must continue to be employed empyrically until it is better understood. Gypsum has been the great stumbling-block in the way of chemists, and the question of its method of imparting fructifying influences to plants is still an unsettled one. The facetious author of a popular book upon husbandry remarks: "There has as yet been found no law by which to govern its application. On one field it succeeds; on another, to all appearances precisely the same, it fails. At one time it would seem as if its efficacy depended upon showers following closely upon its application; in other seasons showers lose their effect. In one locality a few bushels to the acre work strange improvements, and in another *fifty* bushels work no change whatever. Now it is a hill pasture that delights in it, and again it is an alluvial meadow."

Liebig, after having advanced a very decided hypothesis regarding its mode of action, has in his more recent work, "The

Natural Laws of Husbandry," abandoned it, and stated that "the whole matter is still involved in doubt."

It may not be worth while to add another theory to the many already advanced, but I cannot well help saying, that experiment and observation lead to the conclusion, that to neither the salt in itself, or to the separated lime or acid, is its fertilizing influence wholly or uniformly due. Its effects are nitrogenous in some cases. It is capable of furnishing nitrogen to plants, through the agency of an ammoniacal salt, resulting from its soil decomposition.

My attention was drawn to the salt accidentally, by observing a strong smell of sulph-hydric acid, in a mass, at the door of a plaster-mill. This had been trodden upon constantly, and water and mud containing organic matter was solidly impacted with it. Upon examination of a heap in the mill, I found that masses, lying against wet timbers, evolved the same odor. This led to experiment, and it was proved that gypsum in the presence of organic matter, is readily deprived of its oxygen, and converted into sulphide of calcium.

It was further proved, that this salt is capable of absorbing ammonia from the air, and from decomposing vegetable matter, and being thereby changed into hydro-sulphide of ammonia; and this again may be changed into carbonate of ammonia by absorption of carbonic acid from the air. These are some of the changes which sulphate of lime is proved capable of undergoing. But this is not the time or place, to protract the discussion. It seems to me probable, that the different theorists, may be partly right and partly wrong; in short, that the salt is capable of exerting specific influence in several ways, according to the conditions under which it is acted upon. It may furnish nitrogen, or lime, or sulphur, or it may act on some soils physically, and not chemically, by absorption of moisture. If these views are correct, they may account for the doubt and confusion under which the question rests.

In all experiments with gypsum which have passed under my observation, the lands or soils, upon which its best effects are observed, are hilly pastures, with a northern aspect and a moist, moss-covered soil. Mossy meadows are greatly improved under its use.

The theory adopted is, that there must be organic matter in a moist condition, with ready access of air, in order to carry out those changes which have been alluded to. But I do not speak authoratively upon this point. The gentlemen whom I address, have a much more extended experience, perhaps, to guide them.

After what has been said regarding the employment of specific fertilizers, it is probable, gentlemen, that you will have anticipated the recommendation that I have to make, and that is, always to *compost* or *compound* elements of nutrition designed for plants, until a system is established, which will enable us to use single substances understandingly. Chemistry in its application to agriculture, has certainly made advances, inasmuch as it is now capable of demonstrating the correctness of two important propositions: first, that each field has its own peculiar wants; second, that each plant has its own peculiar appetite. It has further established its claims to respect and confidence, by showing that meteorological influences being favorable, we can supply requisite food in the proper quantity and condition, to secure the largest crops, with a great degree of certainty.

The system of Professor Ville already referred to, embraces this idea. He proposes the use of what he denominates a *perfect manure*, that is, one made up of nitrogen, phosphoric acid, lime and potassa. This, when made up and applied in proper quantities, he shows is capable immediately of changing a barren siliceous soil into one of perfect fertility.

I am willing to accept these results in general as in accordance with my own experimental observations during the past three years, or rather I yield assent to the correctness of the principle of producing and applying *perfect manures*. It is noticeable that magnesia is omitted as an element in his manure, par excellence. As we have before stated, there is present in most soils, or there is constantly being formed by decomposition, the minor substances like iron, manganese, chlorine, &c., sufficient for the wants of vegetable organisms, but magnesia cannot be classed with them, as a glance at the composition of some important grains will show.

The ash of wheat affords 12 per cent., or 12 ounces in one hundred; the straw more than 3 per cent.; barley, 7; oats, 10; rye, 10; corn, 8; turnips, 2. These quantities are large, and in the case of wheat grain come next to lime, forming one-eighth of the whole amount of ash.

In countries where magnesian limestone abounds, the supply may be fully afforded by the soil. In France, Germany and England this is probably the case; but in New England we cannot form a perfect manure and overlook the magnesian salts. In all the treatises and statements respecting fertilizing agents made by our chemists and experimenters, we find scarcely any allusions to the importance of the magnesian element, and this is indeed a matter of surprise.

It probably arises from the practice of copying the results of European writers—not from the deductions of original and independent research. Our soils are not constituted like those of Europe, and in the application of fertilizing principles they require different treatment. A perfect manure, then, adapted to our soils, should contain nitrogen, phosphoric acid, lime, potassa and magnesia.

For the cereals, excess of nitrogen is demanded; for leguminous plants, as pease, beans, &c., potassa; for roots or tubers, phosphates. *All* demand lime and magnesia, and these must be supplied in the perfect food made ready for the plant-children of our fields.

Three questions remain to be answered: First, how shall we properly prepare these elements of nutrition? Second, how shall we apply them? Third, where can we obtain them? Chemistry is fully capable of answering the first. Apply all substances to the soil in the finest state of comminution; bring everything into a condition resembling as nearly as possible the excrementitious products of animals, which is the true condition. The bone for phosphoric acid must be reduced to an impalpable powder, and this is not its best form; it is better to dissolve it in acids or caustic alkalies, whose teeth are sharper than burr-mills or any mechanical levigators.

The *potash* must be in combination with carbonic acid, or in the form of carbonate of potassa. This is the most easily assimilable form, but in the caustic condition, as in ashes, it is readily changed to carbonate by contact with air.

The *nitrogen* must be furnished through ammonical compounds, or nitric acid salts. Lime in form of phosphate, hydrate or carbonate, may be employed, and the sulphate of magnesia furnishes the magnesian element in the cheapest, and a sufficiently eligible form. How shall we apply them? This can be understood with a full knowledge of what end is had in view, or what special want is to be supplied. There can be no success under the ordinary conditions in which our agricultural labors are performed, unless an intelligent system is adopted and pursued persistently from one year to another.

It is not necessary that farmers should be practical chemists, to be successful in the employment of fertilizing agencies. A few simple principles, furnished by chemistry, if well understood and earnestly adopted, will enable any one to appropriate to his benefit all the important facts unfolded by science, in respect to manurial applications. In treating a worn-out soil, a combination of all the elements needed for the three great families of plants, should be employed; and if wheat or corn is to be cultivated, fields so prepared will yield a maximum return the first year. The second year, add the proper quantity of that which these grains demand in largest abundance, or which they abstracted from the soil the first year. These will be the *nitrogen* and *phosphate of lime*. If roots have been cultivated, the *phosphates* alone will be needed—if some member of the pod-bearing or leguminous family, potash. The three varieties of plants may be followed in rotation, with success, when by experiment the plan is clearly understood.

The great, prominent idea is, to maintain in the soil all the elements that plants require, and in sufficient abundance. If a particular crop removes a specific agent, supply it. Barn-yard manure furnishes all; and yet, the same intelligence is to be employed in its use, and the equilibrium of elements must be maintained between it and crops. We know what, and how much corn requires; we know how much good manure is capable of furnishing. A fundamental point in good farming is, to secure every ounce of this possible. It is an absurd notion, however, to suppose we can artificially produce it, by ill-adjusted mixtures of turf, sods, chaff and rubbish. We can easily form a huge and dark heap, but if the salts be absent, which almost alone give value, it is hardly worth the labor it costs.

But the supply of barn-yard manure is not and cannot be adequate to our wants, and this brings us to the third question. I wish I could furnish an answer more satisfactory to you, gentlemen, and to myself, than is allowed me. If it was not for the important matter of *cost* or value in known agents, which must always be balanced against the value of products, I could more satisfactorily answer.

At present, bones furnish the cheapest, in fact the only supplies of phosphoric acid,—ashes of potassa—ammoniacal salts, or nitrate of soda of nitrogen. In this country, prices of each of these are not yet so great as to place them beyond profitable employment; but unless the price of farm products continues to advance, in a direct ratio with the rise of the agents, the time will come when their use must be relinquished. Chemists are hard at work upon some problems of great moment to the agricultural interests. These relate to the isolation of those principles of fertility which are locked up in the stony framework of our globe. Here we have reasonable grounds for expectation and hope; millions of pounds of potassa are reposing in felspathic rocks, and it cannot be long before they will be forced by chemical agents, to relinquish their rich hoards of alkali. In the apatite and phosphorite minerals which abound so extensively in New York and New Jersey, we have abundant supplies of phosphoric acid and lime, and to them must we look for future wants.

There is not a single vegetable in the field or wood that does not contain in the ash potash, in some form of combination, and not a plant can be found upon our globe from which the phosphates are absent; therefore we must have full supplies of these indispensable agents.

We live in an ocean of gaseous matter made up of oxygen and nitrogen; seventy-nine pounds of the latter is contained in each one hundred of the mixture. Ready at hand then is this element, but unfortunately most plants are incapable of absorbing it in its free condition. Experiments have been made in France, which give promise of a supply of the ammoniacal salts, the nitrogen of which is derived from the atmosphere direct. If these chemical labors prove successful, we can understand through what source supplies of nitrogen may be afforded. Lime and magnesia are abundant everywhere, and these complete the list of important substances needed to render our fields inexhaustibly fertile.

We can hardly doubt as regards the abundant resources of nature, or cherish a hesitating faith in respect to a future supply of all our wants in feeding the plant-children of our fields. Our mother earth holds within her bosom all the various materials needed for the preservation and well-being of her children. When the woodman's axe ruthlessly stripped her of her rich vestments of umbrageous forests, and by so doing, awakened apprehensions as regards the supply of materials needed to furnish household warmth, we were directed to the outcroppings of black carbon in our immense coal-fields; and when the Nantucket and New Bedford whalemen returned to their wharves, with the alarming announcement of the partial or complete failure of the ocean harvests of oil, the little rivulets of petroleum which oozed from the rocks in Pennsylvania were sounded to their depths, and forthwith the oil spouted forth in such quantities, as taxed all our energies to secure. Let us look forward then with confidence, and trust to the future, and feel assured that chemistry, which holds the key which has unlocked so many rich chambers in the storehouse of nature, will open others fully capable of supplying all the wants of the husbandman.

On motion of Mr. JOHNSON, of Framingham, it was

Voted, That the thanks of the Board be tendered to Dr. Nichols, for his very able and instructive lecture.

The Board then, on motion of Mr. BULL, adjourned without day.

ANNUAL MEETING IN BOSTON.

The Board met at the office of the Secretary, on Thursday, January 31st, at 12 o'clock.

In the absence of His Excellency, Mr. DAVIS, of Plymouth, was requested to preside, and accordingly took the chair.

After the records had been read and approved, attention was called to the Act of 1866 in relation to Agricultural Societies, and the fact that the society at Blandford had elected a member of the Board, having made a return in manuscript, which was supposed to be a compliance with the law. It was

Voted, To refer the returns of the society to a committee to consider whether it can be regarded as coming within the terms of the law, and report thereon to the Board.

The committee was constituted by the appointment of Messrs. Bull, Loring and Saltonstall.

This committee subsequenty presented the following

REPORT:

The Committee to which was referred the application of the Blandford Society for representation on this Board, under the the Act of 1866, report that the society have not complied with the terms of the Act by publishing their Transactions, and are not entitled to a delegate.

(Signed,) For the Committee,
E. W. BULL, *Chairman.*

Attention was also called by the Secretary to the mode of making returns on the part of some of the societies, when a motion was made that the Secretary be directed to notify all the societies that their returns will hereafter be required to be printed in pamphlet form, and to be filed with the Secretary on or before January 15th of each year. The subject, after some discussion, was referred to a committee of three, consisting of Messrs. Moore, Hubbard and Ward.

This committee, after full consideration, subsequently submitted the following vote, which was unanimously adopted:—

Voted, That the Secretary of this Board be requested to notify all the societies receiving the bounty of the State, that hereafter, in addition to the financial returns now required by law to be made on or before the tenth day of December of each year, they will be required to return a full and complete report of their doings, printed in pamphlet form, on or before the fifteenth day of January following.

And that the Secretary will not be authorized to certify to the Legislature, or to the State auditor, that a society has complied with the law, and is entitled to its bounty, unless it has conformed to this requirement.

Delegates appointed to visit the various exhibitions submitted reports as follows:—Mr. Clement on the Middlesex South; Mr. Thompson on the Worcester; Mr. Billings on the Worcester West; Mr. Slade on the Hampshire, Hampden and Franklin; Mr. Ward on the Hampshire; Mr. Sanderson on the Hampden East; Mr. Homer on the Plymouth; Mr. Smith on the Hoosac

Valley; Mr. Huntington on the Barnstable; Mr. Perkins on the Martha's Vineyard; all of which were severally read and accepted.

FRIDAY, February 1.

The Board met at 10 o'clock, A. M., Mr. Davis in the chair. Reports of delegates were presented and accepted by Mr. Hubbard on the Franklin Society; by Mr. Watkins on the Worcester North; by Mr. Chadbourne on the Norfolk; by Mr. Sewall on the Worcester South-East; by Mr. Johnson, of Framingham, on the Essex; by Mr. Saltonstall on the Berkshire.

An Essay was presented on the

CULTURE OF CHICCORY.

BY PROF. P. A. CHADBOURNE.

It would seem to be poor policy for the Board to appoint members to perform work for which they are entirely unprepared, and unable, for want of the proper means, to prepare themselves. I have long known chiccory botanically, and have been lead to fear it as a troublesome weed. But it has only recently begun to spread in my neighborhood, so that I have had little chance to personally observe its value for any purpose, or to see any injurious result from it as yet. What I say must be credited mainly to books, and not to myself.

The Chiccory (*Cichorium Intybus L.*,) is a strongly marked plant, belonging to the natural order *Compositæ*, nearly allied to the lettuce, dandelion, and other well known plants of that order, both cultivated and wild. It has a branching stem adorned with very showy flowers, generally of a deep blue, though white flowers are sometimes found. It has a deep, perrenial root, which now seems to be the chief object in cultivating the plant. Chiccory is described by Parkinson, who wrote more than two hundred years ago, and ascribed to it the medicinal virtues which the United States Dispensatory now mentions as perhaps belonging to it; though the Dispensatory does not admit it among the recognized remedies, but puts it among those substances that once having some reputation, are now considered worthy only of a place in the appendix and small type in that excellent work. It is reckoned as a tonic, very mild in its action, and so, probably, not very injurious as a substitute for coffee, which is its great use. More than a century ago the manufacture of coffee from the roasted root of the chiccory was practiced in Holland. It long remained a secret there, but now seems to be known almost the world over, as every lover of coffee can testify, who has learned the peculiar bitter, puckery taste of this root. To some it becomes so agreeable that coffee without it tastes weak and insipid. It is related of one coffee-dealer in London, who conscientiously gave up the sale of coffee adulterated with chiccory, that he found his customers all leaving him when he gave them nothing but the pure article, and he was compelled to commence anew the old fraud to regain his customers and his name as an honest man.

It was estimated in 1850 that 12,000,000 pounds were consumed in France, and large quantities exported. 12,500 tons were raised in England, besides the quantities imported from Ireland and the continent. That large quantities are consumed in this country, we know ; how large, I have no means of determining. To develop a good root, the chiccory requires a deep, good soil, well prepared. It seems to thrive best on calcareous locations. It is sown in May, and harvested in October. The leaves form a good fodder, but impart an unpleasant flavor to the milk.

The roots may be dug with a spade, piled in heaps, and protected from frost till ready for use. They are generally cut into strips and dried in a furnace, when they are fit for market. They are afterwards burned, ground and sifted, and then some Indian red or other coloring matter added to give the substance the appearance of coffee. It is sometimes used alone for coffee, but generally as an adulteration. A good recipe, as given in the proceedings of the American Pharmaceutical Society, in the article on "Adulteration," is,—for prime old Java, 60 pounds of pease, 20 pounds of chiccory and 20 pounds of coffee. The chiccory itself is subjected to extensive adulterations,—roasted bread, acorns, corn, beans, beets, carrots,—almost everything that can be roasted and ground being added, and Indian red and brick-dust being put in to give the proper color. Chiccory seems to have but little active principle, but its color and bitter taste amuses people with the semblance of coffee. Probably nine-tenths of all that is sold to the consumer is a cheat, being sold as an adulteration.

The seeds of the plant, like those of most of the compositæ are easily distributed, and as it is a perennial and vigorous grower, throwing out branches when the main stalk is cut off, it follows almost necessarily, that wherever it is cultivated it will become naturalized in waste places. It is spoken of by De Candolle, as being found by the roadsides and in the fields in almost all parts of Europe. Such an easily spreading plant should have unexceptionable qualities to justify its cultivation. We have seen enough of chiccory already to see that it may become a nuisance ; we see no good qualities in it either for man or beast, that are sufficient to encourage its cultivation.

This Essay was read and laid upon the table, under the rules, but subsequently taken up and accepted.

An Essay was submitted on

THE MANAGEMENT OF AGRICULTURAL FAIRS.

BY J. M. SMITH.

On the 20th of July, 1794, Washington, then President of the United States, addressed a letter to Sir John Sinclair, in in which he says : " It will be some time, I fear, before an agricultural society, with congressional aid, will be established in this country."

Again, in his annual address, on the 7th of December, 1796, when he met for the last time the two houses of Congress, he said : " It will not be doubted, that in reference to individual or national welfare, agriculture is of primary importance."

Thus it is seen that he who is called the " father of his country " was strongly impressed with the importance of forming agricultural societies, and that they should be assisted by the general government, that they might be the means of diffusing information—of creating and encouraging a spirit of experiment and improvement.

Some few individuals, even before this date, had felt the necessity for some action that would lead to the development of the agricultural resources of the country, and, as the result, the South Carolina Agricultural Society had been established in 1784.

The Philadelphia Society for the Improvement of Agriculture was formed the same year, followed by a similar association in New York, in 1791, which was incorporated in 1793.

The Massachusetts Society for Promoting Agriculture was incorporated in 1792, but owing to the fact that the mass of farmers were not prepared for any progressive effort, and were prejudiced against what might be called "book farming," they did not hold any public exhibition till 1816.

The first agricultural exhibition, ever held in this country, was held in Georgetown, D. C., on the 10th of May, 1810. The society was organized in Georgetown, on the 28th of November, 1809.

The first county exhibitions held in this country, are believed to have been those of the Berkshire County Agricultural Society, whose first "cattle show" consisted of the exhibition of three merino sheep, by a private individual, under the great elm tree in Pittsfield, in the year of 1810.

The Berkshire Society was incorporated in the winter of 1810-11. Although the first exhibition was held in Berkshire County, there had been agricultural societies formed previously. The Kennebeck Agricultural Society was instituted at Augusta, Maine, which was then a part of Massachusetts, in 1800, and incorporated in 1801. An association was formed in Middlesex County in 1794, and incorporated in 1803.

From this era agricultural societies and fairs have multiplied throughout the United States. State agricultural societies have been formed in almost every State, and county societies in almost every county in the Union.

There have been several attempts to establish a National Agricultural Society. In 1840 several gentlemen, with Solon Robinson, Esq., at their head, organized the "United States Agricultural Society," but being somewhat disappointed in not securing the donation which was afterwards given to establish the Smithsonian Institution, they never held a meeting after its organization.

In 1852, a convention was held at the Smithsonian Institute, composed of one hundred and fifty-three delegates, representing the principal agricultural societies in twenty-three of the States and Territories. Annual exhibitions have been held in several of the States, and and there is no doubt but that they have increased the efficiency of the State and local associations, and elevated the standard of excellence of agricultural systems and productions.

The interest of agriculture demands, and it is of so much importance, that it should receive, liberal governmental aid. Figures tell us that agriculture is the leading interest in the country; that forty-five per cent. of our population are engaged in agricultural pursuits,—more than one-half larger than those who are engaged in manufactures and the leading trades, more than four times larger than those engaged in merchandise, and nearly ten times larger than those in the professions.

And our government is doing many things for our whole country. There has never been a time when our National and State governments were doing so much for American farmers as at the present day. And although we cannot see what will be the ultimate effect of this aid upon our agriculture, still there can be no doubt but that a glorious success is reserved for the future.

One of the objects our government has in view, is the elevation of the characters of American farmers as tillers of the soil which they cultivate. The mind must be enlightened in the knowledge of science and arts, before we can proceed a step in any improvement. For this purpose the government has been expending sums of money in collecting reliable information, and in diffusing it among the working farmers of the land.

Statistics show that our soil does not produce from year to year one-half the amount of grass, hay and grain that it is capable of producing under scientific cultivation. And many of our farmers are opening their eyes to this important consideration, and are commencing different systems of agriculture, that they may, by judicious management, raise two tons of hay with less expense than they used to produce one ton. They find that there is an inexhaustible resource of fertility in the soil beneath, and in the air; and that in husbanding these resources, and by taking proper care of the elements of fertility, the soil may be made more productive.

Massachusetts, ever ready to lend her hand to assist in every laudable enterprise, has shown a disposition to encourage every branch of industry,—to open her purse for the literary and agricultural education of all her citizens. By her bounty to the county societies we are encouraged, and the cause of agriculture promoted. In 1838 the legislature of the Commonwealth passed an "Act to encourage the production of Wheat."

At a later date, " An Act to encourage the production of Silk." In 1852 the State Board of Agriculture was established, which now consists of the governor, lieutenant-governor, secretary of state and the president of the Massachusetts Agricultural College, who are members *ex-officio*, and also one member chosen by each of the agricultural societies in the Commonwealth receiving State bounty, and three members who are appointed by the governor and council; in all thirty-three members besides their Secretary.

Our agricultural societies are doing much to elevate the system of agriculture. The annual gatherings of farmers, when their choicest animals are brought together for the inspection of brother farmers, tends to make the annual cattle show the most improving of any day of the year. Farmers learn by sight and comparison. Many a farmer, after attending one of these autumnal exhibitions, has been led to make new resolves, to turn over new leaves, to exert himself, that he may compete with his neighbors in rendering the show more attractive, and thereby he himself is elevated; he is induced to think and investigate, and instead of a mere machine he becomes a reasoning being, and capable of giving information to others.

How our agricultural fairs may be conducted so as to render them of the greatest practical benefit to those for whom they are instituted, is a subject which may well engross our attention. In this State there are twenty-five incorporated societies which hold annual fairs, and in each nearly the same routine is gone through with, differing, of course, as customs and habits in one section of the State may differ from those of another. The most of these societies are the owners of a tract of ground, which is enclosed by a high and tight board-fence. The exhibition is made of all kinds of farm-stock and of agricultural implements. A hall, set apart for the purpose, is filled with grains, seeds, vegetables, fruits, field products, mechanic and the fancy arts, both ornamental and useful, and every variety of manufacture, which is the product of home industry. It is customary, also, to invite some distinguished learned gentleman from abroad to give an address upon some agricultural subject.

Now this is all very well, and is the source of profit to a large class of the agricultural community. Farmers, as a class, do not have holidays enough; do not spend time enough in relaxation, in going about from place to place endeavoring to acquaint themselves with what is transpiring around them; in gaining new ideas and facts respecting their own occupation.

Professor Agassiz tells us that literary institutions should be continually endeavoring to raise their standard of education, and why should not this apply equally well to agricultural schools, societies and fairs? What new plans shall we adopt,—what changes can be made,—what series of experiments can be instituted that facts may be ascertained, statements and theories proved to be either correct or false?

In order to awaken a new interest, we need to make some changes in the programme for the fair days. It has been recommended, and it seems to be desirable, that stock which is brought for exhibition should remain on the ground during the whole time of the show. It is well known that there are objections to this course; but if some way could be adopted by which it could be brought about, it would no doubt prove beneficial.

Every agricultural society should hold meetings for discussion in connection with their fairs. It is by the interchange of sentiments, the exchange of ideas, that we derive useful knowledge. Almost every farmer will have acquired some facts that will be new to others.

Some societies have offered premiums for reports made by committees, that these reports may appear in the society's published Transactions. This is very much to be commended, for every society should publish the report of their doings in a pamphlet form; and it is to be hoped that this Board will recommend to the legislature to pass a law making it obligatory upon all societies to do this, and in case of non-compliance shall subject them to the forfeiture of their State bounty.

The secretaries of each society should be required to furnish a full printed report of their doings, in accordance with the law, as found in the General Statutes, chapter 66, section 5.

Our State gives the annual bounty for the promotion of agricultural improvements, and for our advancement in the knowledge and science of agriculture; and how shall we become acquainted with whatever knowledge others have acquired, if we are not informed of it by the means of the press?

Your Secretary collects, or would collect, from these printed reports all valuable matter to be placed in his Annual Report, which is published at the expense of the State and sent out to the world.

Some societies in our State have adopted the plan of giving the premium in its value in silver plate, which I think is worthy to be adopted by all our societies. However large or small these premiums may be, by this mode every family will have a memento, which, by its daily use, and by its having the name of the donor inscribed thereon, is continually reminded of the giver, and the object of its existence.

In most cases when a small premium is awarded, the money received soon passes out of sight and of mind, with no permanent benefit to the recipient. Again, in many instances a premium is awarded to an individual who cares nothing for its value only as it tells that he received a high premium. And in such instances would not a diploma better accomplish the results desired?

There is one point in the management of fairs that has not received the attention which its importance demands. Instead of the principal attention of those attending the fairs being given to that portion of the show grounds devoted to stock, as cattle, sheep, &c., and to the exhibition of agricultural implements, there is a tendency to allow the exhibition of the horse, in what is called a "horse-trot," to absorb the whole interest, not only of the people, but of the managers and officers of the society. The practice of paying the largest premiums for purposes not calculated to promote their interest, has a tendency to prevent some good farmers from attending the fairs. The practice of giving the highest premium, not to the animal which is calculated to be of the greatest benefit to the farmer, but to those that are kept exclusively for show, will not promote their best interest.

But say the advocates of such performances, "something must be done to draw a crowd." Draw a crowd! Suppose a crowd was not drawn? If an enlightened people who are interested in the highest success of agricultural employment are not interested enough in the exhibition of the best of those animals which the county can furnish, which are not only useful but entirely essential to successful farming operations, to go and see them without being called together by some outside influences, let them stay away.

Is it not a serious question for the consideration of all officers of agricultural societies, whether they are justified in providing for, and promoting, all such performances? Whether they will be justified in spending not only money, but time, to so little public advantage. Mr. Sanford Howard, of the Michigan Agricultural College, in an address delivered by him a short time since, remarked upon the position the horse should take in our agricultural shows, as follows:

"Is any real improvement effected, or even contemplated by these premiums on trials of speed? It has already been remarked that premiums have been offered for the fastest trotting at short distances; only light weights are drawn; so that the contest is reduced to a mere test of speed, wholly irrespective of other properties.

"It follows, of course, that the winning horse is in many cases, not one of any value for any purposes of usefulness. That in some instances he will not bring so much in market as is awarded to him in premium.

"It is true this is not always the result of these trials. Horses that are valuable for something besides speed for short distances, with light weights, do sometimes win; but when they do, they stand no higher in the scale of honor, than the scrub, that has done the same thing. And it must be evident that the offering of premiums for mere speed, if it has any influence at all, tends to the production of horses in which the more useful properties are found in an inferior degree.

"But perhaps it would be asked, would you shut out the horse from any participation in agricultural exhibitions? Certainly not! The horse is one of the most useful of our domestic animals, and his improvement should not be overlooked by agricultural societies. * * *

"If it should be desired to test the rate of speed by time, the fairest way to do it would be to try each horse by himself in a most quiet way. Where horses are put upon the track in competition with each other, it is difficult, and in some cases impracticable, to settle the question of the rate of speed, of which they are relatively capable, on account of the excitement which effects them.

"The 'green horse' of the rural districts, unaccustomed to the strange sights and sounds of such an occasion, cannot act naturally, and stands no chance with the trained nag of perhaps much less power of speed.

"Most persons who have witnessed such contests, must have proof that the race is not always to the swift,—that the tricks of jockeys, have more to do with the result than the speed of the animals. Often has the writer heard the remark, when thousands were watching the result, with breathless anxiety, 'That the drivers knew before starting which horse was to be the winning one.'"

Again, the editor of the "Canada Farmer," who attended the exhibition of the New England Agricultural Society, held at Concord, N. H., in 1865, remarks in his paper upon the corruption of agricultural fairs as follows:

"The display of horses is a fine one, and forms, perhaps, the leading feature of the exhibition. It is rather extraordinary that this should be so, just after a four years' war, which has been supposed to have drained the country of good horses.

"The arrangement and order of the show left nothing to be desired. Provisions were amply supplied at booths and tents on the grounds. No intoxicating drinks were permitted within the precincts, and not an instance of inebriety met our notice.

"We were surprised, however, to find that whirley-go-rounds, and side shows, of bears, snakes, war scenes, fat women and skeleton men, were admitted within the enclosure. Still greater was our astonishment to find that horse-racing formed a most prominent feature in the proceedings, as conducted by the agricultural society.

"There was a trot each day, and purses to the amount of $1,000, were offered by the society out of its funds. The excuse for this is, that the people will not come out in sufficient numbers to pay expenses, unless racing is provided for."

The same editor says further: "Who would have thought this in sober New England, the land of steady habits. Without at all touching the morality of horse-racing, we cannot help thinking that it is wholly out of place at an agricultural exhibition, and if our New England friends are at all inquisitive as to how it 'strikes a stranger,' they are welcome to our unqualified condemnation of the thing. And we cannot help thinking that in various ways, the horse-racing must in a long run, operate unfavorably upon the interests of the agricultural society."

And, gentlemen, if this is the way that our agricultural fairs 'strike a stranger,' and a foreigner, I ask again, if it is not a serious question for the consideration of all the officers of our agricultural societies, whether they are justified in providing for, and promoting such performances.

And is it not about time when all societies who are receiving State patronage should be made to run without the aid of fat women, distorted men, gambling tables and horse-racing? When all gates are taken away, the exhibition made open to the competition of the whole State or county, and free to the whole world?

I ask if the time has not come when this step should be taken, as one of the means for the elevation of the standard and character of our agricultural societies? If our societies cannot be sustained without mixing up public demoralizers, in the shape of gambling establishments and shows of a low character, whereby the evil influence which it has upon a community, and especially upon the rising generation, is greater than the benefit derived, then let them go down.

Better by far would it be for our State to give to each society twice the sum she now gives, than that debasing influences be resorted to to fill up treasuries; for no amount of prosperity can compensate for the loss of public morals.

Better by far would it be if the amount now given to the societies be given to one-half their number, and the other half suffered to die out, than that our young men be educated for horse-racers, drunkards and gamblers!

But our State and county fairs may be made useful. They have contributed to the progress of agricultural improvement throughout the country. Thousands have visited them and have seen specimens of this progress. They have learned that their own animals, which they supposed could not be beaten in the whole world, are left quite in the shade by many which they find at the shows.

The improvements which have been made in everything connected with farming operations can be plainly seen in every agricultural community. A better character of farming is maintained—more thrift and profit. Buildings and fences are repaired, or new ones, built on improved plans, are put in their places; hedges and fence corners are cleared up, and crops yield more per acre. Stock of all kinds is improved; new and pure bloods are introduced; emulation and enterprise are excited, and improvement takes place.

A great change has been made in agricultural implements within a few years. Manufacturers have made use of fairs to advertise their wares, by which means they have been brought under the immediate notice of the farmer, who has commented upon their excellences and imperfections, and improvements suggested, of which the maker has taken advantage. These are some of the benefits which have followed, as the result, either directly or indirectly, of agricultural fairs.

But a great burden of responsibility rests upon the officers and managers of these societies to make these fairs what they ought to be. The right men should be selected for office—men who have strong sympathy with the farming interests, and men who are willing to promote them by attention to the duties of their office.

It is no sinecure to manage the details of a fair; and a man who loves honor, and does not love work, should never accept office in an agricultural society. The committees, especially, should be men acquainted with their respective duties. But a successful fair demands something more than a judicious selection of committees. They must attend to their duties.

But it is out of the power of any board of managers, to make a fair a success, without the co-operation of the people. There should be a hearty, healthy interest in the mind of every farmer in the county, for the successful carrying out of everything which is for the interest of his county society.

Every farmer should take pride in it, and use it as an instrumentality made by him for his own benefit, and should go to its business meeting, with the full resolve to do all that in him lies for its prosperity; that it may be made a power to be felt throughout the county, in the improvement of husbandry, and a direct instrumentality to benefit each, by the influence which it exerts on all.

J. M. SMITH.
THOMAS BILLINGS.
N. S. HUBBARD.

SATURDAY, February 12.

The Board met at 10 o'clock, A. M.

Colonel WARD, of Shrewsbury, was requested to preside, and accordingly took the chair.

An Essay was presented upon

PLANTS AS AN INDICATION OF THE NATURE OF THE SOIL.

BY LEVI STOCKBRIDGE.

An agricultural writer of the last century, says: "That all kinds of vegetables are continually varying in their growth, quality, production, and time of maturity, and he believes the great author of nature has so constructed that wonderful machine (the plant,) as to incline every kind of soil and climate, to naturalize all kinds of vegetables it will produce, at any rate the better to suit them, if the farmer will do his part in selecting the most proper seed." Practical experience proves the truth of this quotation. Plants like men, become naturalized to, multiply and thrive in a soil and climate, remote from, and essentially different from that of their origin. Wheat, a plant of Asiatic origin, has extended its field of growth throughout the temperate zone, and into the borders of the frigid and torrid. It flourishes alike in all Northern Africa, and in the frozen regions and short summers of Norway and Labrador, the steppes of Siberia, and the hills of New England and the Middle States, and the prairies of the West. The same is true of the rye plant; and the potato, native in the mountains of South America, has made for itself, or found a genial soil and climate, in nearly all countries as far north as sixty degrees of latitude. The oaks of England, the larches of Scotland, and the maize of North America, take kindly to opposite continents, and thrive in a soil and climate unlike that of their nativity.

Our forests are a mixture of all the trees of the temperate zone. We find the different kinds of pine, oak, birch, the chestnut, maple, hemlock, elm, and many others in contiguity and often on the same acre, and all showing a growth neither sickly nor scant, and this on soils of varying characteristics and geological formations. The same soil that produces fine, perfect wheat, bears luxuriant crops of tobacco; the same brings forth the skunk cabbage and flowers of rare beauty and delicious fragrance. These facts, potent and indisputable, and so apparently at variance with the teachings of science, that different plants require different food for nourishment, and are adapted to certain soils, is partially accounted for when we come to consider, in the first place, the manner in which all of our soils have been formed and deposited, and the surface changes they have since undergone. Their origin was the solid rocks of the globe, which by abrasion and disintegration, by the action of heat and cold, of air and water, have been broken down and ground to powder of a greater or less degree of fineness. Each rock of distinct geological formation, produces a homogeneous soil of its own essential characteristics, and fixed adaptation for the growth of plants requiring support by its peculiar mineral constituents. But the great water currents of different periods, in the same and in opposite directions, and the constant washings and depositions of rains and springs, have often commingled these distinct soils, and given them a heterogeneous character; and if instances are found where distinctive quality is left, they are deposited at a distance from the place of their nativity, except in a limited degree in the lime and sandstone formations. Thus plants created for very different purposes, of varied construction and characteristics, and requiring essentially different food for their perfect development, find in the same locality, and side by side, their peculiar mineral constituents, and extract from the soil such and only such as that development requires. Another cause of the heterogeneous character of our plant growth, is the means nature has provided for its planting and distribution. The wind, water currents, birds and animals are God's planting husbandmen, and drop their seeds at random, without seeking for the adaptation of the plant to the soil. Seed thus planted germinates wherever there is sufficient moisture to expand its covering, and the young plant seeks, finds and appropriates its natural food. Other causes that effect plant and soil adaptation, are elevation and aspect. Soils of the same geological origin, and which to the practical eye are perfectly alike, are found to sustain a very different vegetable growth at the base, and on the top or side of a mountain of moderate elevation. And at the same elevation on opposite sides, north and south, one produces oak, chestnut and maple, the other white birch, hemlock and laurel. The most difficult problem to be solved, if the theory of fixed adaptation of plants to soils is true, is the succession of vegetable growth on the same soil, or nature's crop rotation.

The dense primitive forest of pine, on its native granite soil, being removed, is invariably succeeded by oak, maple and chestnut. The primitive crop of oak, chestnut, birch and maple on a soil best adapted to it, when destroyed, is succeeded by a growth almost exclusively pine; and this rotation occurs on soils of clearly-marked geological character. Notwithstanding these indisputable facts of plant-distribution and rotation, it is yet true that plants, to a limited degree, partake of the nature of the soil in which they grow, and chemical science and observation prove that only in a soil characterized by their own mineral constituents, can they find food for their *perfect* development. Rye, native on the granite soil of the Crimea, when removed, brings forth its best proportions, and in perfection only on a similar soil, though it grows finely on most soils that are not destitute of silica. The willow seeks the water-courses, and many grasses and plants are found native only on the margin of streams, or in the vegetable deposit of the muck-swamp, while others are found on light silicious loam or arid sands. The grape receives its flavor, to some extent, from the soil on which it grows, and with an identical aspect and elevation, localities but a short distance apart, but of different soil, produce a very different quality of fruit of the same variety. Seeds of wheat, produced by a forced growth on soils deficient in lime, are found deficient in the best qualities for animal nutrition; and if soluble silica is wanting, its straw has not the necessary hardness, and it falls and fails to ripen. Many other plants are changed in color, in general appearance and intrinsic perfection by the soil which nourishes them, and others still, when removed to an uncongenial soil, sicken and die. The seeds of the pine, lodged in the marsh or on the mountain, with a mixed soil-bed, take root and flourish in a greater or less degree of perfection, according as they find in abundance or otherwise their peculiar mineral constituents; but nature shows its true home to be on the granite soil of the sandy plain, as seen in the primitive pine tracts of New England and the Carolinas, or of Russia and Siberia, and wherever found as the prevailing or exclusive growth, indicates a soil of light silicious loam, with a small per cent. of organic matter, perfectly adapted to the growth of the rye-plant, of easy adaptation to corn, and, to a limited extent, to wheat; a soil which forces plants to a rapid growth and early perfection, but too porous, and not sufficiently absorbent and retentive for grasses and other grains. On the other hand, the prevailing or exclusive forest being hard-wood, oak, walnut, elm, birch, maple, tell of a soil of finer and firmer texture, with more of organic matter, and with great power to absorb and retain. They indicate a capacity in the soil to nourish and bring to perfection all the best grasses, wheat, oats and barley, and of easy adaptation to corn, fruit and edible vegetables. Pure forests of hemlock or spruce are usually found in their primitive state on soils of slate origin, or covering mica slate, and are of less value for agricultural purposes than hard-wood soils. They grow grass in greater abundance than pine soils, and produce the coarser grains indifferently well, but for the finer grasses and grains are not desirable. The practical man, seeking a kindly soil for cultivation, would shun that whose natural wood-growth is the cedar, as one coarse in texture, nearly destitute of soluble plant-food, either mineral or organic, and on which the limited plant-growth would hardly repay the labor of cultivation. The same is true of many of our shrub-plants and the red and white mosses,—indicating a soil composted, insoluble and lifeless, deficient in potash and lime, difficult of cultivation, and capable of producing only a scant growth of coarse herbage. There are some plants, which, though of themselves a nuisance to the farmer, are a sure indication of a fertile soil, full of plant-food in a soluble state, and easy of cultivation. Of this class are the thistle, the yellow dock, burdock and morning glory, telling of a soil highly organic, of remarkable fineness, of great absorbing power, and all its mineral food in a state to be easily taken up by the plants germinating upon it. Some of the grasses, one of which is the beach-grass, seek almost pure sands for their home, and by their rank growth indicate a fertile soil, but they should be to the farmer a sign of sterility for all ordinary purposes of cultivation. Plants potted, and treated with several varieties of food, have the power of indicating to the operator that best adapted to their development, and the slightest change of materials placed in the soil, is often the difference between total failure and perfect success.

So it is in the great work of field-culture, by a wise and judicious observation and management, the operator is enabled often by slight additions to the soil, to so change its mechanical or chemical condition, as to produce with certainty and in perfection, plants which seek a different soil. But the great success with small cost accrues when nature and art combine, and work in harmony for the same grand result.

LEVI STOCKBRIDGE.

An interesting discussion followed on topics suggested by the Essay, when it was laid on the table, but subsequently taken up and adopted.

An Essay was also submitted upon the

ADAPTATION OF CROPS TO SOILS.

BY JOHN B. MOORE.

This is an important subject, and every intelligent person will at once see the necessity of adapting his crops to his soils; for by that plan only can he succeed in uniformly producing good crops.

And why is this so? It is for the reason that certain soils contain the particular food required for the perfection of certain plants, while at the same time they are deficient in some of the requisites for another class of plants; or, if they have the particular requisites, they are held in such a condition as not to be available as plant-food.

Now a soil to grow any plant in perfection must contain the necessary food required by that plant, in such quantities and in such a condition that it may be readily assimilated and taken up by the minute rootlets of the plant for its use and nourishment; but still a soil may contain all the nourishment required—the nitrogenous matters, the humus, phosphates, and all other elements ordinarily necessary for the growth of plants—but be lacking in some one particular, water, for instance, which would unfit it for the growth of one variety of plants, while too much moisture in the same soil would most certainly render it unfit for the growth of some other plant.

Thus we find that there must be the proper amount of moisture, and also heat, to produce plants in perfection, as well as soluble plant-food.

Some plants are better suited with one kind of soil, and others with an entirely different one. Beans, corn, rye, barley and buckwheat prefer a warm, and the first a rather dry soil; wheat, oats, the grasses, and most of the roots, require a heavier and more moist soil to grow them to perfection; while grass and potatoes seem to be the most suitable crops to cultivate on a moist or peaty soil. We are well aware that some of these varieties of plants produce good crops, in favorable seasons, on all these different kinds of soil—as grass and potatoes in a wet season will produce good crops on dry soils, when in a dry year they will prove nearly a failure.

Many of the best farmers in this State endeavor to adapt their crops to their soils, and to put them in a proper condition to sustain the particular crop, and succeed well when not prevented by the fluctuations of the seasons, more particularly as regards moisture. Others, who do not pay any attention to it, make a total or partial failure occasionally, and do not succeed, as a general thing, in producing full crops so often. As an instance, a farmer, who has a swamp composed almost entirely of vegetable matter, on which he has grown potatoes in abundance, seeds it to grass in August. In the month of June following he finds his grass with slender stems, totally unable to support itself erect, so that the crop falls down, dwindles away, and results in nearly a failure. If he is a novice in farming, and has never seen such effects before, he inquires the reason for this, and finds it is simply because he has not furnished to the grass one particular element necessary for its perfection. So, on a soil otherwise admirably adapted to grass, the crop results in a failure for want of a little silica, which could have been furnished in a light dressing of sand, the want of which rendered the soil in this instance unfit for or not adapted to the crop.

So far we have divided soils only as relates to their moisture. The divisions commonly found in Massachusetts are sand, or sandy loams, clay, clay loams, vegetable, or peaty soils, or the different combinations of them. Each of these, by its composition, is better adapted to the successful production of some varieties of plants than to others. As we have before said, beans, corn, and some other plants prefer a sandy loam, although they will grow well on a clay loam, when not too wet; oats, wheat, and some varieties of fruit, as the pear and plum, grow best on a soil where there is a large proportion of clay; grass and potatoes on a vegetable or peaty soil, and also on all of the soils which have been named, where there is a sufficient quantity of water present to supply the wants of the plant. Of course, to produce healthy plants, which must in the end result in good crops, all these varieties of soil must contain or be supplied with an abundance of proper and nutritious food, suitable for the perfection of the particular crop expected to be grown, and in a condition immediately available for its use; for plants, like animals, attain to greater perfection when they are grown without receiving any check.

As an illustration: How is it with the breeder of stock? If he is an intelligent person, he will, after providing suitable animals to breed from, combining all the requisites he desires to perpetuate in the progeny, carry out still further the necessity of the case, and not stop there, but will see to it that they are well fed, cleaned, sheltered, and receive such other care, that the animals may be thrifty and good specimens of their races.

There is the same good reason for feeding a crop; for after providing a suitable soil, it will not do to stop there, and not furnish the proper amount of food for a full product, for a small or medium crop may not pay expenses, and will require nearly the same amount of labor for cultivation, and the same outlay for land as would be necessary for a large crop which would pay a good profit over all expenses.

It is within the power of most farmers to amend the soils on their farms to some extent, and thereby adapt them to a greater range of crops, as by dressing sandy soils with clay, which, by that means alone, will make them become permanently better and more productive, and will give to the soil greater power of retaining moisture and manure for the food of plants, while an amendment by the application of muck or peat will give value for a time, but would be exhausted by cropping in the same way as manure, only at a slower rate. On clay soils the application should be directly the reverse,—that is by dressing with sand, for the purpose of giving the soil less tenacity, and making it more loose, porous and friable, and also by the application of coarse manures, which not only supply food for the growing plants, but mechanically loosen such soils.

Chemistry has done something towards showing us the necessities of plants, and what they require as food; still there is one element in the production of good crops which the most eminent chemists have not been able to detect by the most careful analyses, either in soil or crop, and one which we cannot expect them to find, although it is of the utmost importance to successful farming. I mean a reasonable amount of brains that have been trained not only theoretically, but practically, by agricultural observation, experience and practice, sufficiently well to be able to adapt the crops to the soil, and furnish the proper food for the same. For this we must not rely on chemistry, but on our schools and colleges, and more particularly that thorough observation, together with experiments and practical growing of crops on all soils, which makes an intelligent and observing farmer master of his business.

To an inquiring person the small word 'why' often suggests itself, and is a very expressive one. We raise a fine crop of wheat, and not having been successful heretofore with that crop, if we have not the brains spoken of, we at once attribute it to luck; but if we have, we desire to know the reason why. If we could only tell exactly the reason why, of course we could do it again. The next year perhaps we fail in getting a good crop, and why this failure? Is it not as a general thing from the want of adaptation, or unfitness of the soil, either from the want of the proper fertilizers or some other cause? This same rule will apply to the success or failure in all crops, and shows the necessity for careful observation and experiments, and that not manual labor alone, but head work is essential to success.

This whole subject we regard as very important to every person who is cultivating land, for success will materially depend upon the judgment used in this respect.

The Creator of all things has furnished us with the soil, heat from the sun, moisture from the clouds and dews, and all other proper constituents for producing a crop, leaving us to adapt the crop to the particular soil intended for its cultivation, to prepare the land and apply the proper kind and quantity of manure, to plant the seed and cultivate the land, and to use all the means within our reach in such an intelligent, timely, and proper manner, as to insure success to us as farmers. Shall we avail ourselves of every source of information within our reach, from books, newspapers, teachings of practical farmers, or shall we plod along in the old track, exhausting the soils and decreasing our crops?

This is a question of vital importance to every farmer in the country, for upon his practice in this respect will, to a large extent, depend his individual success in producing good crops, which is truly the result of adapting the crop to the soil, and supplying the requisite amount of manure.

JOHN B. MOORE.
A. P. SLADE.

This Essay having been read and discussed, was laid on the table under the rules, but subsequently taken up and adopted.

The following Essay was submitted upon

TRANSPLANTING FRUIT AND FOREST TREES.

BY ASA CLEMENT.

Planting and replanting trees has engaged much of our attention during twenty years last past; and, as we think, owing to the great variety which spring up spontaneously in almost all the surrounding forests, the multiplicity of useful offices which it is evident the Great Architect designed them to fill, thereby contributing to the happiness of him to whom He gave dominion over the beasts of the field, the fowls of the air and creeping things on the earth, our interest in the subject does not diminish as age creeps over, and Time leaves its footprints marked upon our visage. Indeed, when we reflect upon the wisdom and goodness of Him who furnished this almost endless variety of trees with which to beautify the earth, together with other important services which they render to us, it would seem to be the height of ingratitude to manifest, not merely indifference to, but a want of enthusiasm in, a matter which contributes so largely to our comfort and happiness as intelligent beings, and dependent as well.

In planting any tree which is drawn from the soil with naked roots, we regard it essential that all mangled roots should be trimmed carefully or entirely removed, and that all roots cut off with spade or other blunt-edged instrument should have the end smoothly pared to where the wood is clean and sound. When trees are treated thus and set, a row of fibrous roots shoots into the soil at once from the clean cut ends.

In the case of evergreen trees, which we usually cut round and raise out of the soil with a ball of earth adhering to the great mass of rootlets which that class of trees generally send out, the necessity for root pruning may not seem so urgent, yet there are instances, frequently, when the knife may be applied to advantage.

When, as is sometimes done, deciduous forest trees are set in barren, gravelly places, let an excavation be made large enough to take in a cart-load of good soil, and wherever trees are to be planted, whether in the well prepared border, the well tilled field, or on the lawn, holes should always be made sufficiently capacious to receive the roots without cramping. Neither is it less important that the roots be all spread out in their natural position, and the earth placed round them in the most careful and thorough manner, the while, keeping the head plumb over the stool, in order that the replanted tree may keep its position after the work is done. We can scarcely imagine a more unsightly appearance than a line of trees recently planted, some of which lean one way and some another, all points of the compass being indicated by the inclinations. In locations where newly set trees are exposed to raking winds, we recommend placing about the roots a little coarse litter, and upon that some flat stones, to keep the mulch in place and the trees in position. We are not a believer in tying trees to stakes to *hold* them in place, nor would we use stakes in tree planting except to protect them, in case of necessity, against damage by animals, and then at a little distance off, when, by a judicious use of listing or leather straps, injury by chafing would be avoided. The preceding remarks are applicable both to fruit and forest trees.

Of our native forest trees which will bear removal with scarcely room to doubt of success when the work is properly performed, may be named the elm, maple, ash and birch families, in all their variety.

The lime (basswood,) is a beautiful and honey-producing tree, as safe in removal as a crab-apple. Hickories and oaks much more uncertain. Chestnut ditto, though we believe the latter are less liable to fail. All, however, may be moved when quite small, successfully, if a reasonable share of skill, care and labor, are devoted to the operation.* All our native evergreens, we think, may be safely transplanted, if in digging, a portion of the soil is removed with the roots. There is one class of deciduous trees which we much dislike, viz., the poplars.

Some of them are attacked by borers and nearly or quite all of them sucker badly. The abele, even, we would not use except in particular localities. Our native white ash when planted in the cities, makes a clean and fine looking tree, but is liable when thus located, to be attacked and destroyed by borers. In the country where birds are more plenty, we have never known a failure from such source.

Among the imported trees which endure the rigors of our New England winters are the Scotch larch, Norway and sycamore maples and Norway spruce, the latter one of the very best evergreen trees. There are others which are hardy, also, and many which will not endure our climate, but which thrive a few degrees south of us. There is no lack in variety or quantity of deciduous or evergreen trees for all practical purposes for which transplanting is resorted to. We ought to have mentioned in another connection that trees which cast their foliage in autumn should, at the time of planting, have the branches that are inclined to straggle cut back, and the head brought into symmetrical form. If the roots are few in number or cut off short, let the branches be shortened correspondingly.

We have frequently planted rows of elms and sugar-maples directly from the forests, which had, before cutting off the heads, much of a fishing-rod resemblance, but, after planting, were more the pattern of a bean-pole. Those trees are always furnished with dormant eyes, or little buds which never would push unless forced to do so. They may be discovered at the base of the branches along the main stem, remaining in the same position many years, or until induced to grow, through a loss of branches or the top of the tree. Some of the best rows of trees within our knowledge were produced in that way.

It has always seemed surprising to us that so little interest should be manifested by landholders, generally, in relation to such simple and yet so beautiful adornments as the planting of a few trees by the roadside, around the buildings, or in comparatively waste and barren places.

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* Alluding to the hickories reminds us of an error that occurred in the published report last year, upon the "management of forest trees" in remarks upon the hickory family, where we wrote "bitternut" the printer made us say butternut, which is a great mistake in a small way.

Scotch larch and pitch pine will grow where a mullen would not spindle fifteen inches high. Those trees, gray birch or river birch, appear much more agreeable to our vision than complete barrenness. The chestnut will thrive on a comparatively sterile soil. The trees should be taken from the nursery or from open ground, where they have been exposed to the sun a part of the day at least, otherwise they will catch a sun-scald which they cannot endure. They should be removed when quite small, and care taken not to chafe the roots, else the operation proves a failure.

The European lime, mountain ash and native locusts are all trees which thrive in some places, and would in many others if the borers all had their pincers broken. So long, however, as there are plenty of varieties which resist the attacks of insects or their larvæ, and which are perfectly hardy, we need not enumerate a catalogue of those which have proved otherwise.

The elms and sugar-maple are in our view the leading sorts for street-planting and roadside shade. Lime, white ash, horse-chestnut, larch, with occasionally evergreens interspersed, for variety's sake, may produce a good effect in relieving the tedium of monotony. We regard it as a duty of all landholders upon our public highways to plant shade-trees by the roadside. Perhaps, though, it would be better for towns in their corporate capacity to take the matter in hand, and relieve individuals from such burdens. At any rate the subject cannot too frequently or too strenuously be urged upon the attention of the community at large. Travellers, whether pedestrians, equestrians, or in vehicles of any style, or of no particular style, do not often fail to appreciate the advantages to be derived from shaded thoroughfares during the heat of summer. Why, the thought of driving through a village where the houses are mainly painted a glaring white, in an August sun, without a green tree to relieve the eye or cast its shadow, will almost produce a painful sensation without the reality of a ride.

On the other hand, we venture the assertion that no gentleman or lady, who had the slightest claim to such titles, aside from *pants* and *skirts* which covered their nakedness, has driven through the village of Pepperell within the last fifteen years without experiencing pleasurable emotions through the aspect produced by the lines of maples which shade the streets. Other places are equally noticeable.

Some farmers who have numerous acres in other places, plant fruit-trees along the fences by the public highway. The expediency of such a course was never apparent to us, because there are two serious objections to it, viz.: It is tempting people to break the eighth commandment; and many such trees, when large and bearing, prove to be much in the way. Loaded teams breaking branches and prematurely shaking down the fruit, is no uncommon occurrence. A public highway should not be thus or otherwise infringed upon. Set appropriate shade and ornamental trees close up to the fences on the roadside, and the fruit-trees where the branches will not hang over the streets.

Open and bleak situations are in large measure unsuited to the growth and bearing of fruit, from the fact that trees thus exposed are liable to assume a leaning position, rendering them less capable of supporting great weight, and increasing the danger of being uprooted, with the additional drawback of having much of the crop threshed off before maturity. If the selection of a more favorable location is impracticable, plant at once belts of forest trees near the skirts of such orchard that is to be, in such manner that the force of strong currents shall thereby be broken. The better location for an orchard of apple trees is a side-hill or gentle slope, considerably elevated above the bed of streams and frosty hollows, and protected on the north and west sides by still higher grounds or by forests. No damage will arise, but rather beneficial results, from protection on all sides.

Newly-cleared land is preferable for this purpose, because such soils contain more of the ingredients which enter into and nourish the growing trees than old land, so called, without much preparation and continual care being bestowed upon the latter. If land for this purpose is taken, from which a heavy growth of oak or other hard wood has been recently cleared, apple trees will thrive for many years with less than half the attention and dressing that will be requisite to produce the same results on an old field. If rocks abound in the soil, no detriment will accrue to the growth or bearing qualities of the trees from that source, but rather the reverse on both points. After transplanting an orchard, keep a sharp look-out for borers, which will be found to enter the smooth and green bark, not unfrequently where the branches fork, but more generally near the earth's surface. The larvæ that has found a lodgment in the branches, will, in almost every case, be found and devoured by the woodpeckers between the months of October and April, while many of those which enter near the ground will escape the harpoon of those sensorial birds. Hence the necessity of examining often all the young trees where this pest does prevail.

We have learned that the mother beetles will not deposit their eggs upon a coat of lime whitewash, and, as the wash works no mischief, we do not hesitate to recommend the application of a good coat early in the month of June—first scraping the earth away from the stool and cleaning off the rags, or rough bark, that the wash may thoroughly cover the bark from the surface up the trunk, eight to twelve inches. In operating in that way we have found that where spots were left uncovered, the little pests would find the way in. After the wash is applied, let the soil be replaced, or the roots will be attacked, which is seriously objectionable.

All insects or larvæ, which prey upon the foliage should be guarded against, that the leaves may be abundant and healthy.

Forcing, high culture, recommended by some may be the wiser course to pursue in many localities and with some varieties of apples; but truly, if that course should be adopted wherever apples are grown throughout New England, there would be a great failure forthwith of some of the less hardy sorts, in many places.

The Ladies' Sweet, Baldwin, the latter the leading winter apple in this region, not unfrequently freezes to death when kept growing late in the season. The more safe and more economical method of treatment for that tree, is to give a suitable location, avoiding sandy soils and frosty hollows, bestowing that amount of attention and dressing which will give a fair growth early in the season, allowing the wood time to ripen up before winter approaches. Treated thus, the hope of harvesting many crops from the same tree may be safely indulged.

There are other varieties which will not bear the hot-bed and forcing process with any degree of safety, even in northern Massachusetts, with open orchard culture. In close, protected gardens in the cities and suburban towns, losses from winter killing more rarely occur, and altogether different treatment may be admissible and even desirable.

Probably there are but few localities in the State where a large majority of the highly prized apples will not bear considerable forcing; yet, while there are some that will not, we think the exercise of at least moderate discrimination, in the mode of treatment, will be followed by beneficial results.

It may not be amiss to touch briefly upon varieties, not that we desire in this connection to recommend a list for any particular locality, or for general cultivation, but rather for those who are about to transplant an orchard, or a garden, it will be important before making purchases to consider well the purpose for which fruit is wanted, whether for home consumption, for a neighboring market, which it is desirable to attend statedly or occasionally through several months, or whether the market is at such distance that the more judicious course will be to convey the fruit thither in bulk and wholesale, then make the selection strictly with reference to the demands of the place. Much fastidiousness is frequently manifested by purchasers of trees, because, forsooth, they do not appear so thrifty as they hoped to find them.

Many thousands of apple trees have been transplanted by the writer, and we have always observed that in the case of those trees which had been forced, making long shoots the preceding year, a good deal of cutting in of those long branches must be done, or a lean and stinted growth followed. We apprehend that the difficulty lies in the fact that there are too many buds for the roots to support, for such trees do not usually contain roots proportionate to the head, or top, and we account for the curious facts in this way. The trees having previously drawn their nourishment from fat, fertile soil, so many mouths were not required, or if they were they could lie nearer together, and draw in all the nourishment needed to push the trees vigorously. On the other hand, we have almost invariably observed that trees of moderate or slow growth, the superinducing cause of which was scarcity and want of food, the balance between the root and top was better kept up, and in many instances the preponderance of root over the top was clearly apparent. Such trees removed to soil in better condition than that from whence they came, in our experience, have seldom failed to make good growth the first year, thus corroborating the correctness of our theory.

We are writing about trees which were afflicted with *no* disease—deficiency of food alone, was all that retarded the making of wood. In that condition we have set many hundreds which had for some years increased so little in size that it was difficult to ascertain their age. The results proved satisfactory, with rare exceptions.

To the peach the remark that there is nothing more certain in this world than that everything is uncertain, seems to apply with peculiar force, especially if we take the number of crops which have been harvested during the last nine years as the basis for arriving at conclusions.

Many are of opinion that another cycle of years will produce different results; that ere long the frequent seasons of abundance of this delicious, refreshing fruit will "come round;" and to show that their faith is a living one, they continue to plant trees. For the encouragement of those who desire and are determined to try to cultivate peaches, we will remark that from a little experience and more observation, we have arrived at the conclusion that the north and westerly slopes of high lands are far better than a southern declivity. Several of the most fruitful orchards which we have known on the northern border of this State, and in Hillsborough County, N. H., had exposures where the mountains in the distance, in the west and north-west, were in full view.

Were we philosophers, we would reason in this way, in order to convince others of the soundness of our views on this head. The peach is a tender tree, and seldom found in the winter in condition to resist freezing to the extent of more than ten degrees below zero, without destroying the fruit buds and much injuring the vitality of the tree. It is also quite sensitive to sudden and violent changes in the weather, and scarcely less so during the period of rest. Now, then, on the high ground, although the aspect seems rough and bleak, the mercury does not run so low as it does in the hollows and less exposed situations. Neither are the north and west sides of such elevations so much affected by thawy periods during winter. In short, trees thus exposed do not freeze so hard, do not thaw out so often, do not experience so many degrees of warmth, and, of course, are permitted to remain more nearly stationary, which approaches what is needed. Better still, could locations be found, and made available, where the variations should prove vastly less in degree and more unfrequent.

ASA CLEMENT.
S. JOHNSON.
GEO. A. KING.

After the reading of the Essay it was laid on the table, to be taken up for a second reading, when it was adopted.

An Essay was presented on the

CULTURE OF THE CRANBERRY.

BY GEORGE A. KING.

Within a few years the culture of the cranberry has become one of our important industrial interests. In the county of Barnstable alone the value of the cranberry crop for the last year was not less than one hundred thousand dollars. A considerable degree of care and attention has been bestowed upon the cultivation of this fruit, and the ordinary conditions of its growth are very well understood. There are, however, a number of perils which the cultivator of the cranberry is obliged to encounter. These are the frost, the worm and the rot.

1. The destruction caused by the late frosts of the spring and the early frosts of the autumn has been so frequent and extensive, that the feeling has become general among cranberry growers that no bog is of much value unless it is so situated that it can be protected from injury from this source. The only means by which the disastrous effects of late and early frosts can be averted is an overflow of the bog. Fires have utterly failed to furnish protection against the frosts; and in order to successfully counteract them, an abundant supply of water is indispensable.

2. Another difficulty in the way of successful cranberry culture arises from the ravages of the worm, of which there are

two kinds. The most destructive is that which is known as the vine-worm. The first indication given of the presence of this worm is about the latter part of April, when, by careful observation, a small miller is discovered about the cranberry bog. This miller punctures the fruit-bud and lays its egg within it, and having been visible about ten days, disappears. Then, in warm localities, the larva makes its appearance in the bud about the fifteenth day of May. At first it is hardly discernible, but it feeds upon the bud and the vine and grows rapidly, and in about ten days comes to maturity. It then webs itself up and lies in the chrysalid state for seven days. Then the miller shows itself for ten days, lays its egg, and disappears as before. This generation appears in comparatively small numbers. They inflict no material injury upon the vine. But about two weeks after the disappearance of this miller—and this is in the last part of June or first of July—the larvæ of the next generation make their appearance upon the vine in great numbers, and for the ensuing ten days their ravages are very great. The worm begins at the top of the vine and eats downward, destroying the blossoms and the new growth of the vine. When they are very numerous they feed also upon the growth of the previous year. From the tenth to the fifteenth of July his career is ended, and he passes into the chrysalid state to appear again in due time.

It is said that three and perhaps four generations of this worm appear during the season, showing themselves on the bog as late as October. The vines, however, do not suffer from them to any appreciable degree at any time except during the early part of July. The only method of protecting the vine against this worm is by flowing. When the water is kept upon the vines until the first of June the generation of the worm is prevented, and so far as he is concerned the crop is safe. This worm bears a resemblance to the apple-worm. Its color is light, with a bluish tinge, and its head is black. It is about three-eighths of an inch in length when fully grown. The miller appears to be somewhat longer, is of a gray color, and has a white stripe across the back. It flies but a short distance, usually not more than a foot at a time. There are two bogs in the town of Dennis lying close together, being separated only by a road that runs between them, the vines running to the ruts on either side. Yet one of the bogs has been infested for more than one season with the vine-worm, while the other has escaped entirely.

3. The other worm from whose depredations the cranberry bog suffers is known as the fruit-worm or berry-worm. The miller is first seen about the 25th of May. Towards the middle of July it deposits its egg under the skin of the growing fruit.

The worm makes its appearance in the berry during the last of August. Its presence is shown by a premature redness of the fruit. In about ten days he destroys the berry and emerges from it, and passes into another. One worm will destroy perhaps half a dozen berries. Then in the early part of September, it goes into the ground and lies in a chrysalid state until about the 25th of May, when it appears again in the form of a miller, as before stated. Although this worm destroys the fruit to a considerable extent, its depredations are far less serious than those of the vine-worm. Indeed, I have heard cranberry growers say they cared very little about the fruit-worm. When they destroy a portion of the berries upon the vine, the remaining ones grow to so much greater size as to compensate in a considerable degree for the loss of those which they take.

The remedy in the case of the berry-worm is to flow the bog after he has eaten out of the first berry, and is exposed to the effects of the water. This worm resembles the vine-worm in size and form. Its color is white with a yellowish tinge, and its head is red.

4. Another obstacle in the way of cranberry culture is the rot, which is observed about the first of September. Until within a few years no great trouble has been experienced from the rotting of the berry, but it now constitutes a peril of a good deal of magnitude in the way of the cranberry grower. And it threatens to be as destructive as the worm or the frost. In the season of 1865, Cyrus Cahoon, of Harwich, one of the most extensive as well as one of the most intelligent cranberry growers of Barnstable County, had a fine lot of growing cranberries estimated at eight hundred barrels. The berries were however invaded by the rot, and only 171 barrels out of the 800 were saved.

This form of injury to the crop is comparatively recent, and as yet no method has been devised to prevent it. Cranberry cultivators are not agreed as to the cause of the rot. Dr.

Stone, of Yarmouth, who has bestowed much careful and intelligent observation upon the subject of cranberry culture, is of opinion that the rotting of the berry depends upon the character of the vine. Others think that it depends upon the nature of the soil.

These particular perils, which I have enumerated, are sufficient to show that the cultivation of the cranberry is very hazardous, without a ready and abundant supply of water, and that the crop may even then be lost by causes beyond control.

For the Committee,

GEO. A. KING.

This Essay was adopted after taking its second reading in regular course.

MONDAY, February 4th.

The Board met at 10 o'clock, A. M., Mr. STEDMAN in the chair.

A Report was presented on the

AGRICULTURE OF WORCESTER SOUTH.

BY N. S. HUBBARD.

In making up a report of the condition of agriculture within the limits of the Worcester South Agricultural Society, your Committee would say that attention is not given exclusively to any one branch of agricultural industry, but is made up of those best suited to the more hilly portions of Massachusetts.

The crop which receives the most attention, and the one from which the farmers of this locality must in some way derive their greatest revenue, is from the grass and hay crop, so that much attention is given to improving the condition of the pasture and mowing lands. It is impossible to improve the condition of pastures, to a great extent, in the same way the cultivated fields are, by ploughing or top-dressing with compost manure. It is too often the case that the pasture land is entirely neglected; left to produce what it may, without even spending one day in a year to remove brush or shrubs that have come up to choke the growth of more useful herbage.

I have noticed with astonishment sometimes the difference in the production of land apparently similar, by removing the brush and the application of plaster. This, in some localities, is extensively used, and is found to be one of the most profitable investments the farmer can make. By the application of two hundred or two hundred and fifty pounds per acre once in two years, many pastures produce twice or even thrice the amount of feed that would be produced without its application, and of a far superior quality. Where it is used and found to be thus beneficial, the farmer depends almost as much upon plaster for his pastures as he does upon manure for his cultivated fields. Where plaster is adapted to the soil, I think nothing can be used by the farmer that will bring so good returns for the amount invested. As it is not adapted to all soils, every farmer in all localities cannot depend upon it for increasing the productiveness of his pasture lands. It is better adapted to hilly pastures, or the land most natural to the production of clover.

The hay crop the past season, although better than the year previous, was hardly an average one. This was in part owing to the extreme dry weather of the two previous summers, causing many of the grass roots to be killed upon fields that had formerly been ploughed. The abundant rains of the past season greatly improved them, so that the prospect for a future crop is greatly increased.

The corn crop was not large, owing in part to the continued cool weather in the month of August. Some portions of it were fair, while others were light. This is a crop that cannot be raised here as profitably as in the valley of the Connecticut River or some other portions of the State. The crop is not sufficient for home consumption. Large quantities are transported from the West for the use of farmers as well as others.

The potato crop was quite good, with very little loss from the rot. The price was sufficient to render fair returns for its production. Wheat is not raised in large quantities, although many farmers nearly supply themselves with this product, and I think many more would get quite as good returns from wheat as oats. The past year oats suffered very much from rust, and the crop was quite light. In some instances the oats were hardly heavy enough to pay for threshing. Rye and barley are raised in small quantities.

Garden vegetables are raised mostly for consumption within the limits of the society. The cabbage crop was beyond the demand for family use, and in some instances was fed to stock; and I am satisfied that it is valuable for that purpose, as many tons can be raised upon an acre. The root crop receives some attention, but not as much as in many other parts of the State. I have seen no such quantities as I saw upon the premises of Dr. George B. Loring, of Salem.

The fruit crop, except pears, was almost an entire failure. I hardly saw or knew of any peaches grown within the limits of the society; and but few plums or cherries. Much attention has been given to the setting of fruit trees, especially the apple and pear. But the past two years has dampened the ardor of some, fearing that their fond anticipations are not going to be realized. One fruitful season, however, will probably in a measure dispel these doubts. We have not as yet suffered from the effects of the canker-worm, as have some parts of the State.

In the northern section of the society, Brookfield, Warren, and Brimfield, the attention of the dairyman has been turned to the furnishing of milk for Boston market, and is still continued. A car runs regularly from Warren to Boston during the entire year. It has carried 201,073 gallons of milk, which has brought to the farmers the sum of $31,753.94. There is a condensing milk and cheese factory at West Brookfield. The amount of milk used I was not able to learn, or the amount of income. They have made about 30,000 pounds of cheese, besides the condensed milk.

There is also a cheese factory in the south part of Warren, using the milk from 450 cows, from that part of Warren, and the north part of Brimfield. This factory was in operation from the first of April, till the first of November, and made 142,767 pounds of cheese, from 170,823 gallons of milk. The cheese was mostly sold to Charles H. Stone, of Boston, and Lane & Adams, of Springfield. The whole amount of receipts for cheese, was $27,067.36. Whole amount expended in the manufacture and materials used, was $3,369.85. This leaves a net profit to the farmers, of $23,697.85, or sixteen cents and six mills per pound. In the bill of expenses for manufacture, materials, &c., freight and marketing are not included, as a large part of the cheese was sold at the factory. Freight and marketing from Warren to Boston, was not far from three-fourths of a cent per pound. In addition to the above income, the whey is estimated to be worth from four to six dollars per cow.

With these improvements in the management of the dairy, and the modern machinery brought to the aid of the farmer, much of the labor, both in doors and out, is very much lightened, and the business rendered far more inviting, as well as more remunerative.

I give a list of thoroughbred stock, as far as I have been able to obtain it. Bela J. Stone, of Sturbridge, has fifteen Ayrshires; J. A. Rich, of Charlton, has eight Ayrshires; the Hamilton Woollen Company, of Southbridge, have eleven Ayrshires and six Jerseys; W. Hammond, of Charlton, has five Durhams; E. M. Holman, of Millbury, has five Durhams; Daniel Dwight, of Dudley, has one Durham bull; Waldo M. Healey, has five Devons; H. H. Stevens, of Dudley, has one Ayrshire bull; Simon Carpenter, of Charlton, has one Durham bull; Zephaniah Baker, of Dudley, has some Devons; S. F. Marsh, and Nathaniel Upham, of Sturbridge, have some Devons. There probably are others, but these are all that I have positive knowledge of, within the limits of the society.

NEWTON S. HUBBARD.

This Report was adopted, when a similar Report was offered upon the

AGRICULTURE OF MIDDLESEX NORTH.

BY ASA CLEMENT.

In our meanderings around that part of the county composing the society which we represent, in search of material for a report which would in some respects prove interesting, edifying or instructive to any one whose eye should meet this, it has seemed much like the pursuit of knowledge under difficulties.

Possibly there is nothing new, unique or strikingly different in the husbandry of this from other sections of the State. Nevertheless, owing to the position and *central* circumstances, (if the expression is admissable,) Lowell, a thriving manufacturing city, being the hub of our agricultural wheel, there may be some peculiarities in the towns composing the spokes and rim of this wheel, which farmers have fallen into, or felt constrained to adopt in practice, and for which there may not be a demand in other localities, which are not familiar to outsiders. Perseverance being a virtue when given to a good cause, we resolved to make an effort; and if we shall be obliged to recognize the word *fail*, it won't be the first time we have been thus caught.

Let it be remembered that eleven towns and one city only are embraced within the limits of Middlesex North; that nine of those towns are within ten miles of our local market; that there is a large and increasing demand in that market for firewood, lumber, hay, straw, fruit and vegetables of all kinds; and so great is the demand for milk that almost numberless farmers sell all the product from their cows and depend, like most *citizens*, upon Vermont and New Hampshire for a supply of butter and cheese. So great has been the rush in the business of market-gardening that cabbages, tomatoes, green corn, melons, squashes, and even potatoes, last harvest-season, settled down almost to old-fashioned specie currency prices. Supply and demand must regulate the price of those as well as other articles, and like other things they will find their level.

Fruit, in our district, has not been abundant or cheap since 1862. Pears and grapes are grown to considerable extent in city gardens, and neither, in large quantities outside the city limits. Within the last year a few thousands of grape-vines have been planted, and more will continue to be from time to time. Peaches have played out, apparently, though many are determined not to be discouraged in relation to them,—we admire their pluck. Plums are as uncertain as peaches, or more so.

Apples have been scarce and high in price, the last three years. Instances may be cited, however, in our district, where the apple crop has not in long years been so profitable to the owners as during the last three. In no case is that true where the proprietors permitted the tent caterpillars to overrun their orchards. Some there are who have learned that care and attention bestowed upon fruit trees is absolutely necessary in order to secure returns, and that with this bestowal, remunerative returns are almost sure to accrue. It is a source of gratification to us that so few have lost faith in the apple. The next good and general crop will set the few doubting ones on tiptoe, when great will be the demand for trees to plant. We find in every employment, almost, some whose perseverance and courage sink below zero, at a shock so slight as scarcely to be noticed by others. Let the timid ones, and all the faithless, observe the course pursued by the hopeful, who apply vigilant and vigorous strokes, leaving results to Him who sends sunshine and showers.

Much attention is given to raising strawberries, rhubarb and asparagus.

There is another enterprise which many of our farmers have latterly engaged in quite extensively. The production of parching corn may be regarded by some as a matter unworthy a notice here. Taking into account the amount consumed by one family alone, it would be so; but, like that of friction matches, the consumption is enormous. Gentlemen may be astonished when we inform them, that fields of this corn in our vicinity, consisting of three to twenty acres, are not of rare occurrence. Large yields per acre are never sought after, because of the inferior quality of the article. Sandy soil with but a medium dressing is preferred. Raised thus, the quality is always good.

With the disposition made of limited quantities of this article we are all somewhat familiar; yet the statements which follow may not prove entirely devoid of interest to many who shall read them.

Oliver M. Whipple, Esq., of Lowell, has formerly produced much of this grain, though for reasons best known to himself he planted but seven acres last year.

Justus Richardson, of Dracut, usually plants from eighteen to twenty-two acres, mainly on light soil, using for dressing 120 bushels of spent ashes per acre. His crop the last year, 1866, on twenty acres, amounted to 1,150 bushels, unshelled. Not a large yield, truly; but, when the cost of dressing the land, and of nursing the growing crop—no seeds of noxious weeds being distributed with the manure—is considered in connection with the price at which the article sells per hundred pounds, it turns out very profitable, compared with other farm crops.

William Manning, of East Chelmsford, just without the limits of the city of Lowell, has fitted up an establishment which he is running successfully, but which, if not strictly agricultural or horticultural in its details, will at least show where an outlet is found for much of the article about which we write. From October to July we learn from Mr. Manning, that *ten bushels* of *shelled* corn are daily used (popped,) making a prodigious pile.

From July to October, the demand for the manufactured articles is not so great, but yet, much finds its way to market daily. In Lowell there is another establishment, where considerable in amount is similarly used.

We have learned some facts in relation to blood stock in the towns from which Mr. Moore was unable to secure returns last year, but these facts do not bring to light any secreted specimens. One gentleman in a neighboring town, to whom we sent a blank to be filled, replied at once that there was not a pure blood in the town. Similar replies were received from other sources. Upon inquiry among the larger milk-producers, we found that very little stock of any kind is raised by them, that they depend upon the market to keep good their supply of cows, arguing that calves can be raised and stock grown cheaper where they have not a ready market for everything which a growing animal would consume. On the Fox farm in Dracut, which we believe is the largest milk-producing establishment within the limits of our society, keeping, as they do, from sixty to one hundred cows, we were informed that their former practice was, when these animals were comparatively low in price, to buy new milch ones, feed high, and milk as long as the flow was profitable, and then turn over to the butcher. Since this kind of stock has reached a high figure, the better animals have been kept over and permitted to come to milk in the natural way. When we inquired for blood stock, but two grade Durhams, and one that appeared to contain some Jersey blood, could be found in the herd.

We were informed also, while there, that no attention whatever was paid to blood in selecting cows—that they were kept for milk alone. The sixty which we saw tied in one barn, as a whole appeared remarkably well. If the substance of the preceding lines is not what was looked for by the Board, we trust that by them they will be led to infer that it is not through a want of energy and thrift that our people have given so little attention to stock-breeding; but that nearly all the wide-awake men have branched off into other channels; which is strictly true. Surrounding, or, as we have before written, central circumstances, have seemed at least, to demand this course.

While our farmers have generally displayed much sagacity in adapting their course to the demands of the times, we must admit that there are some exceptions to this rule. Individuals fail to comprehend the difference between this and their grandfathers' time, if the line pursued is any criterion by which we can judge. Storing their hay and grain in the same old rickety barns, they of course tie their cattle in the stalls with about five and a half feet of space between the floor and scaffold over head, compelling a man of medium height to assume a bending posture on entering ; reminding one of rheumatism, receiving an occasional bump on the occiput, with other slight inconveniences, all of which would naturally teach one to exercise caution, a due share of which every one should possess. Then, of course, the solid part of the manure is daily thrown out at the same board windows behind the cattle, while the liquid portion is permitted to run through the floor, to be absorbed by the ground underneath, and kept out of the way of everybody.

Two hundred rods of board-fence are kept up around some worn-out piece of pine plains, that ten sheep may be pastured thereon, because grandsire did so. If a hog is to be killed for home use, 'tis done at the full of the moon, that there may be no loss by shrinkage, when boiling the pork.

The family are domiciled in the same old house, which has received just repairs enough to keep it from tumbling down and no more. If the orchard that grandsire planted continues to produce apples, the old musty barrels are filled up, and " horsed up " as we sometimes hear, in the same dark cellar, so that the old gentleman may have the means at hand for quenching his raging thirst and straightening his back-bone, when coming in from feeding and "*cleaning out*" the cattle on a cold winter morning. Grandfather, used to take his mug in one hand and a pine torch, or lighted splinter in the other, and go down, down into what he called " sullur " to draw his cider ; but the grandson, after looking and sometimes expressing audibly his regrets that the pine-knots are all used up, is compelled to resort to what he regards as the *next best* thing—a tallow candle, when he enters the dark regions below. Some, are so far demented as to keep a jug or cask of the miserably extended liquor of the present day, with which to arouse their flagging energies, for the reason that grandfather and father always kept rum in the house. Is it not true that many of those underground excavations, dark, gloomy and loathsome, have all sorts of disagreeable odors ascending therefrom, even the smell of sulphur, reminding one of other regions? We would treat such plodders with all the respect and consideration to which their position entitles them; but, at the same time, if they cannot or will not be profited by the example set by their neighbors, a gentle *hint* may do them good.

These remarks in relation to thriftless persons who have so much regard for the customs of olden times, gentlemen will readily enough see, are applicable to persons with whom they are acquainted in all sections of the State. That they are exceptions to the general rule, we readily admit, and are thankful that the number is not greater. Also, that the remarks are intended for those alone to whom they will apply.

Good husbandry is understood and practised by much the larger share of our agriculturists. The fact that from nine to twelve dollars per cord is paid for all the stable manure that can be found in the city; that the night-soil is seized upon with avidity, farmers in many instances paying something for the privilege of clearing vaults, is conclusive evidence that the value of fertilizers is highly appreciated. After all, it is becoming a question with many whether paying so much for manure, and freighting the same from two to five miles over hills and through valleys, is not equivalent to buying money and paying a bonus for it.

Barn-cellars are generally kept well supplied with absorbents in the form of meadow-mud, scrapings from the roadside, soil from old headlands, or other material, which is occasionally thrown under the cattle, thus furnishing a strainer for the liquid droppings, and preventing in large measure the escape of volatile fertilizing properties. This constant care and attention to the saving of, and to the purchase of manure must not be remitted where the crops are conveyed to market in the form of vegetables and hay. On milk farms, where the roots and hay are fed to cows, and what is conveyed away from the farm goes in the more concentrated form of milk, less difficulty is experienced in keeping the soil fertile, comparatively so, at least.

Having alluded to barn-cellars, we are reminded of remarks occasionally thrown out by an *oddity*, that he would not have such an institution under his barn. The sentiment and remarks would be excusable, perhaps, had his knowledge of them been confined to such as we have witnessed in one or two instances. If a cavern is dug out under an old barn standing in a hollow, the owner need not be surprised if the manure is sometimes diluted with more water than is necessary or convenient. If such cellar or excavation has become a receptacle for ploughs, harrows, wheelbarrows, or other necessary adjuncts to farm operations, in addition to the manure heap, and these implements are frequently found submerged in cold, though not colorless, tea, the aspect is far from delectable.

During the last twenty-five years we have seen many barns erected, but in *no* instance without a cellar under the same. In more cases the sites have been selected with as much taste and judgment as the circumstances would allow, having special reference to saving and increasing the quantity and improving the quality of the manure. This is as it should be. The importance of saving everything which can be converted into food for plants is a growing sentiment that is becoming more firmly fixed in the minds of thinking and observing men from year to year. It is not a sentiment for thought, merely, but is being acted upon intelligently. The country is advancing in age and the population becoming more dense, rendering an increased and increasing amount of food for the support of human life a necessity; hence an imperative demand for a more bountiful supply of food to supply vegetable life.

In view of the fact that so little attention has been paid to the rearing of blood stock in our district, we feel constrained, in concluding our remarks, briefly to urge attention to this business. Remember that the extra expense of breeding blood stock is in the first cost alone. Having once started in the right direction by procuring your breeding animals, exercise prudence and judgment in pursuing the system in order to prevent contamination in the blood, and we apprehend no difficulty in the way of realizing abundant success.

While we are ready to admit that the great mass of farmers have not the means to branch out into experiments, unless they are first assured that success will crown their efforts, it is to be regretted that so many are chary of small risks. Perhaps a better way of putting the case would be to say that too many of us are so attached to the old beaten track that it requires much talking, coaxing, and very often more convincing arguments to drive us out. Be that as it may, we are confident that if some of our agricultural brethren who are now raising scrubs at haphazard would expend a few hundreds of dollars in the purchase of animals adapted to their location—animals whose pedigree could be traced, and reliance placed in them for producing like—they never would return to the helter-skelter practice of scrub-breeding again. We discard the idea of treating the subject in the light of an experiment, for it is a fixed fact. Many have succeeded in raising blood stock after their own pattern, and what has been done can be again. The fact that some do not succeed does not militate against the theory or the practice.

There are some who never succeed in anything they undertake, unless we except the building of air-castles, thus rendering themselves ridiculous, which they seem to do as naturally as a dog seeks for offal.

Asa Clement.

This Report was also accepted, when the following was submitted upon the

AGRICULTURE OF MIDDLESEX SOUTH.

BY J. JOHNSON, JR.

In the commencement of the following statement in regard to a portion of the county of Middlesex, I cannot but feel some degree of hesitation and embarrassment, considering that a minute and interesting report was made so lately as last year upon this section by Capt. John B. Moore, of Concord.

The Middlesex South Agricultural district comprises eleven towns, with a populatian of forty thousand six hundred and fifty-four. The soil is varied, and generally well adapted to the cultivation of grass, Indian corn, oats and rye. Wheat crops, in some parts, are frequently raised, which well compare with those in our Western country, while in others they have proved a complete failure. It is a conceded fact that this crop is a great exhauster of certain elements of the soil, and, if it is desirable to continue its culture, we must supply the soil with those materials which go directly to nourish this plant and grain. Different plants require different elements. In a word, it is as essential to supply plants with that kind of nourishment which their peculiar organization and design demand, as it is to furnish man or beast with that kind of food required to impart vitality, vigor and strength. The average number of bushels of wheat raised per acre in this district probably does not exceed fourteen, but some of our best cultivators obtain from twenty to thirty. This would be considered a large yield at the West.

As a saving of time and space, I will reduce the expression in this Report, as far as possible, to the form of figures.

This district embraces 1,859 farms; these support 5,880 milch cows. The number of gallons in milk sold was 621,929; average price per can was 45 cents, amounting to $139,558. From the 209,695 pounds of butter sold, averaging 42½ cents per pound, was realized $89,220. Veal, per carcass, averaged $4, amounting to $23,129. Cheese is not manufactured to any extent, only 6,940 pounds, at an average of 13 cents per pound, amounting to $920. The aggregate income from milch cows appears to have been, from these statements, $252,827. This, however, does not include the amounts of these several products consumed in families supported on the farms. This presents an an average income of about $50 per cow.

The number of oxen and steers owned in the district is 1,351, valued at $101,451. It will be borne in mind that ours is a *farming* district, and yet we have 3,397 horses, valued at $341,330. I do not propose here to discuss the relative value of horses and oxen as a stock to be adopted by farmers. More than one-half as many horses are included in the district as there are milch cows, but all of these are not the property of our farmers; if they were, this section might well be characterized as one of *horse-farming*.

We can report only 55 bulls of all bloods, valued at $3,993. Can we reasonably expect to improve the *blood* and quality of our stock with this proportion of one *bull* to one hundred and seven *cows?*

Our farmers have, during many years, *raised* nearly all their swine. The loss by disease has been comparatively small; whereas, from several lots purchased in Brighton, for farms in Southborough and Framingham, in the autumn of 1866, large numbers died of the so-called "hog cholera." I am informed that the loss to one gentleman amounted to about $180. To those who have suffered in this manner, a lesson has been given. Should not the pens at Brighton undergo thorough renovation? But the best remedy for our farmers generally, is either to raise their own swine or purchase of a neighbor.

This district comprises in English grass lands, 18,644 acres, yielding about 17,844 tons of hay, or a little less than *one ton* per acre, valued at $524,535.

In meadow grass lands, 8,787 acres, yielding 7,100 tons of hay, or less than one ton per acre, valued at $82,802.

The yield of potatoes was from 2,054 acres, 177,958 bushels; being about eighty-five bushels per acre, valued at $146,928. A large proportion of the potatoes raised are sold in our villages or in Boston market.

We report the turnip, carrot, beet and other esculent vegetable crops at 25,065 bushels, valued at $11,784.

In market gardening twenty acres, valued at $28,314.

The cabbage crop was valued at $12,088—that of onions at $3,355.

In Indian corn were planted 3,074 acres, yielding 103,000 bushels, valued at $144,196. This crop, as has well been said, is the *golden harvest of our land.* For man and beast it stands first in the list of cereal plants.

Oats raised on 1,033 acres, gave 24,783 bushels, valued at $19,912. Grass-seed does not usually take as well sowed with oats as with barley, rye or wheat; still, oats are more generally raised than either of these grains.

The acres in barley were 426, yielding 7,493 bushels, valued at $9,218. This is an important grain, and should be more generally raised.

But 74 acres in buckwheat were raised, valued at $317.

The wheat crop only 38 acres produced, valued at $1,054.

Rye was sown on 577 acres, producing 7,985 bushels, valued at $12,809. Mixed with other grain, rye is used for feeding purposes to some extent, and is considered excellent for milch cows and swine.

Grapes are not extensively raised, no large vineyards being cultivated. The amount received for this crop was $24,484.

A few green-houses have been established, from which were sold during the year in plants and flowers, in lettuce and tomato-plants the amount of $6,470. This does not particularly appertain to farming, but we think it worthy of mention, and should be encouraged by our agricultural societies.

From fruit of various kinds, berries, &c., we received the amount of $110,831, of which the apple crop was a small proportion. The number of apple trees cultivated for fruit is 192,487 ; but, I regret to say, these are reported to be generally in a failing condition.

The annual income from poultry appears to have been $21,841.

I find, by examination, that the crops enumerated in the preceding statement amount to $1,413,795, of which grass alone is estimated to be worth $607,327, showing conclusively that this crop forms the principal source of our dependence.

Now, gentlemen, allow me to propose a question. If we should conclude to increase our stock, endeavoring to make the best selections, and consume more nearly all the hay, grain and vegetables raised on our premises, or only disposing of some of these in exchange for some other more profitable supplies for feeding, with a view to increased productions in beef, pork, mutton, poultry, and especially of *milk*, butter and cheese, would not our income from these sources equal or exceed those amounts now received from the sales of so large a proportion of those crops? Attended, as this practice must be, by a very *large increase of manure*, affording to our soil greater facilities of fertility and higher cultivation, may we not well mark the prominent inference that our farms, within a period of seven years, might produce nearly double the present amount of hay, grain and grass, allowing our stock to be increased in the ratio of these productions.

This seems to me an important question for us to decide ; and I hope we may consider it in all its bearings and with regard to our highest welfare.

Somewhat bearing upon this subject, I feel inclined to subjoin to this report the statement of a gentleman residing in Sudbury, Mr. John H. Dakin, with which he has kindly favored me, in regard to his particular management of milch cows, and which I think goes far to show what might be realized from the *five thousand eight hundred and eighty-five cows* included in this district, by proper feeding and management.

I will also subjoin an interesting statement by Mr. G. H. Thompson, of Framingham, in regard to his experience in raising poultry, which has been kindly afforded.

Statement of Mr. John H. Daken.

After a trial of the different breeds of cows, I give the preference to the Ayrshire, for a milk dairy. They are hardy, well shaped, of medium size, and give good returns for the amount of food they consume. They are well adapted to our short pastures and long, cold winters. Much depends on the management of cows to make them profitable; gentleness should be observed, and exact regularity in the hours of feeding while confined in the stable, and milking throughout the year.

I keep my cows *in the stable* through the winter, except in pleasant weather, I turn them out a short time for exercise. We commence milking at five o'clock in the morning; and after milking feed with grain, then with hay. After they have finished eating the hay I water them, which will be at about nine o'clock, A. M.; they are then allowed to stand until noon, when they are again fed with hay. They have nothing more until four o'clock, when they are watered and then grained again. At five I commence milking, and after finishing, feed with corn stover. I feed a mixture of rye, corn, and cotton-seed meal, about five quarts, and twenty pounds of swale hay and corn stover per day, to each cow. For bedding I use dry sand, preferring it to any other. There is no animal pays better for careful attention than the cow. She should have enough to eat and drink, and be kept clean and warm. The milch cow is more liable to diseases than any other stock, the most troublesome of which is garget. It is easily cured if taken in season. I give one ounce of saltpetre, and wash the bag in warm soap-suds; let the bag dry, then rub on bacon-fat. In a day or two the cow will be all right. I keep twenty-two cows.

I have sold this year, 1866, 5,559 cans of milk, which brought	$2,034 36
Twenty calves, at $3.00 per head, . . .	60 00
	$2,094 36
Expenses, including hay, grain and pasturing, .	1,286 00
Income, ...	$808 36

I think the manure will pay the labor and interest on the value of the cows, and all other expenses, not in the above account.

SUDBURY, January 1, 1867.

Statement of Mr. G. H. Thompson.

I had last January about thirty fowls ; sixteen were Brahma, two Hamburg, six Poland, and about six Sicilians. In April, thinking I had too many kinds, I sold the Hamburg's and Polands. I have bought most of my eggs for sitting of a neighbor, whose hens are nearly full-blood Brahma. I have now eighty-five fowls in all, fifty Brahma, the remainder Sicilian and mixed fowls. I have sold $69.23 worth of poultry ; and the eggs have amounted to $81.45, besides those we have used, making $150.68 ; and the extra fowls, I think, are worth $50, which is much less than I would sell them for, as thirty-four of them are Brahma, and I have none so small as some I sold for two dollars each, about six weeks ago. Adding the increase of value of fowls, to the amount sold, makes about two hundred dollars ; and I think the eggs we have used will balance those bought to set.

I have not kept account of the keeping much of the time ; but from that kept I think two dollars per week must more than cover the cost for the whole time, which will leave nearly one hundred dollars profit.

FRAMINGHAM, December 17, 1866.

It is a gratifying fact to me and one in which I doubt not all will take an interest and some encouragement, that I am able to report a large increase of blood-stock over the returns of last year. Of this class, I find one hundred and sixty-four, many of which among the different breeds, are very superior animals.

JOHN JOHNSON, Jr.

FRAMINGHAM, January 1, 1867.

This Report having been accepted, the following was submitted on the

AGRICULTURE OF WESTERN HAMPSHIRE.

BY M. F. WATKINS.

The Highland Agricultural Society held its annual exhibition at Middlefield, Hampshire County. The charter granted designed to embrace that portion of Hampshire, Hampden and Berkshire Counties in a degree remote from other societies.

The towns in proximity are Washington, Becket, Chester, Worthington, Peru and Hinsdale. The majority of members reside within the circle mentioned, yet there are many in towns more remote.

The geographical survey represents a district mountainous and broken, with high ridges, deep, narrow valleys, and abundant streams created and fed by crystal springs from a thousand hills. The soil is various, it being peat, muck, loam, sand and gravel, black and yellow loam predominating.

This district is naturally adapted to grazing. Ourselves, content with Nature's plan, have yielded cheerfully to the special requirements of the locality where our good fortunes have placed us, and never attempt to cultivate the soil only in a limited manner. We spend but little strength ploughing and hoeing, or sowing and reaping. Nature has done our sowing ; our domestic animals do, to a great extent, our reaping.

The average size of our farms would be about two hundred acres. The amount tilled is nearly as follows: One acre of corn, two of potatoes, three of oats, buckwheat and barley; sometimes a few rods of carrots, turnips, beans or pease ; the aggregate amount being six or seven acres to each farm.

The corn crop is considered a paying crop only upon a small scale ; as we increase the amount beyond what we can manage very nicely, we decrease the profit. The potato crop is far more remunerating, and attended with much less expense. The fact that our farmers raise two acres of potatoes as often as one of corn, is sufficient proof that the potato crop pays best.

The average yield of potatoes per acre is about 150 bushels ; the average selling price about fifty cents ; amounting to $75. The average amount of corn per acre, 40 bushels ; selling price, about eighty cents ; amounting to $32. The average crop of oats and barley is about 30 bushels.

Our meadows embrace that portion of our farms which has the smoothest surface and is easiest of access. Two-thirds of our meadows have never been ploughed. Some of our best farmers are sanguine that ploughing good natural grass land is malpractice in farming, and recommend that we avoid ploughing such land as long as possible, applying the manure upon the surface in the month or August or September. One-fourth has never been blessed with a dressing of manure, but is mown once a year; and, I am sorry to add, is generally fed by stock through the fall, which, in my opinion, is very injurious, and contrary to the true principles of successful farming.

The amount of hay grown upon an acre is from one-half to three tons, varying to correspond with its management. A small amount of our hay crop is sold, nearly all being consumed upon the farm. Our desires are best satisfied when we have an abundant crop of grass, as we rely upon this crop for cancelling the mortgages from our farms.

Our pastures are rocky, rough and broken, not generally susceptible of tillage; consequently what we do to regenerate their productive capacity, aside from underdraining, must be applied to the surface. Included in the fields we pasture is considerable waste land, that at present would not pay for reclaiming, which is left to the tender mercies of nature, and our stock that roam over it.

Ninety out of one hundred of our farms have woodland sufficient to furnish wood and lumber for home consumption. Fifty out of one hundred have a surplus, by which our villages, manufactories and railroad corporations obtain an abundant supply. Large amounts of wood and lumber are yearly transported from our hills to the nearest railroad station, and instead of the majestic forest, we have the cash proceeds at our disposal. Much of the farmer's time in winter is spent in this business, and frequently a part of his capital has gone with his time and woodlot without any favorable realization.

One-half of our farms have a sugar-orchard, which is used to a greater or less extent. The amount annually produced within the towns mentioned is about one hundred and twenty thousand pounds, which has been an item to us worthy of notice for a few years past. The making of maple-sugar in March and April, is a business that comes at a season of the year when we can neither be engaged in lumbering nor farming, consequently the time we devote we can spare as well as not; the wood we consume is usually of inferior quality; therefore the thousand pounds of sugar the farmer produces costs him really but little, and adds much to his comfort, it being not only a necessity, but a luxury, which we would not willingly forego.

Some of our farmers keep no stock, scarcely, but fine-wool sheep. Instead of the style of sheep kept here twenty years ago,—fleeces weighing only two or three pounds per head,—we have improved our flocks by introducing the Vermont Merino, and the weight of our fleeces now is about four pounds each, which has increased the net profit more than fifty per cent. There is chance still for improvement, as is plainly shown by some of our best flocks producing five and six pounds per head instead of four.

This Vermont Merino investment is all that saves us from being compelled to abandon this favorite pursuit, owing to the nominal cost of growing wool in the West and South-West. There is no stock so easily managed, making so little trouble, summer and winter, as the fine-wool sheep. The coarse-wool sheep receive very little attention with us, yet there are some excellent specimens of the coarse-breeds.

Some of our farmers owning large pastures, buy in the months of March and April from fifty to one hundred farrow cows, or a corresponding number of three-year old steers, turning them upon the pastures as soon as there is abundant feed, where they remain until an Eastern purchaser appears, buying the lot, usually in the month of July, reserving the privilege of taking them in lots of ten or twenty at once, to suit his convenience. Some of our farmers have made small fortunes in this business within the last ten or fifteen years.

Some of us milk cows every night and every morning, Sundays and rainy days not exceptions. Some make butter, some only cheese; others, more skilful, manage to obtain both. Here I would drop a tear for the Eastern consumer. There is but one or two milk carts within my limits. Others keep a few extra breeding cows, always raising the calves from a respectable sire, compelling them to grow rapidly and mature early; if two or four happen to be steers, they are broken to work, and trained to appear well when a purchaser comes into the yard.

The majority of our farmers keep a variety of stock,—a few cows, some steers, some sheep, two or three colts, swine, geese turkeys, chickens and bees. This class are, perhaps, most successful; it may be for natural reasons. The bee gathers honey abundantly from the wild flowers upon our mountains; our poultry not only glean the fields of the little grain we scatter in harvesting, but are destroyers of myriads of insects, which, if not destroyed, would be destroying the crops we so carefully husband.

Our sheep are greedy to get that which the horse utterly refuses to eat, while the colts thrive nowhere so well as when they are allowed to pick their rations from the sheep-rack, readily accepting that which the sheep rejects. A variety of stock in the same pasture as well as the barn seems desirable, if we would save all and let nothing be lost.

In all the different pursuits of agriculture, I am happy to state, there is manifest progress among us. Our dairymen boast of Dr. Loring's and William Birnie's Ayrshires. Our beef-makers show you the descendants of the herds of Thorne, Lathrop, and others. Our working oxen refer you to the former stock of S. & L. Hurlburt, while our young horses are claimed to be the lineal descendants of Justin Morgan.

We have the Berkshire, a sprout from old Black Hawk, owned in Becket, which is the popular sire of many of our young horses. Also, General Grant, of Hamiltonian stock, owned in Hinsdale, having recently come to us backed up with strong credentials. He is considered a horse of great promise.

Not satisfied with the ways of forty years ago, we have begun to reclaim swamps, underdrain our meadows, dig and remove the rocks, using our horses for mowing and raking, instead of ourselves, consequently finding time to attend farmers' clubs, festivals, cattle-shows, and to read Flint's Agricultural Report, building better and more commodious houses and barns, doing more to beautify and ornament our homes.

We have to-day, instead of the light fleece Saxon sheep, flocks of high-bred Spanish Merino, with an occasional sire, carrying a twenty pound fleece upon his back. In place of the Old Bakewell, we can show you samples of the best South Downs and Cotswolds the country affords. Instead of the native cattle, poorly fed and bred, without care or forethought, we produce animals bred with careful study, well fed, that are not beat at our glorious New England fair.

We are proud of such stock, but prouder by far of the men whose intelligence, energy and enthusiasm, have prompted them to engage in so laudable an enterprise.

Our climate is healthy, our homes are happy, our inhabitants strong and industrious, faithful to their families, honest in dealings, temperate in habit and true to their country; blest with noble sons, virtuous daughters, a clear conscience, a contented mind and a reasonable hope for fourscore years and ten.

M. F. WATKINS.

This Report was accepted, and the following was presented on the

AGRICULTURE OF BRISTOL.

BY AVERY P. SLADE.

In accordance with the vote of the Board, I herewith submit such facts as occur to me in relation to the agriculture of Bristol County. The agriculture of Bristol County presents as great a variety as can be found in any other county in the State. While no particular crop is made a speciality, grass, corn, rye, oats, barley, potatoes, turnips, and a creditable variety of fruit may be found on almost every farm in the county. A marked improvement in farm-husbandry is evinced by the earnest efforts almost universally made, not only to increase the quantity of manure, but to improve its quality, and also by the more careful and judicious manner in which it is applied to the growth of crops. A few years ago and the entire droppings of a stock of cattle during winter were thrown out by the side of the barn, to be washed by the rains and to be dried by the sun, until the fertilizing properties were thoroughly extracted and spirited away by the winds of heaven. Now almost every barn —every new one, at least—has a cellar, which is made to receive the droppings of the cattle, together with a liberal supply of muck, loam or sand, which the hogs very readily and effectually convert into excellent manure. The refuse of cities and large towns is eagerly secured and hauled to the farm, leached ashes by the cargo are brought from Maine, Long Island and Northern New York, and large sums are annually spent for concentrated fertilizers.

Since the high prices of labor, our farmers seem to have made the discovery that a large crop is more profitable than a small one. There is no county in the State—perhaps not in New England—that is furnished with better or more convenient markets than Bristol County. The surplus produce of all kinds finds a ready sale at good prices in Fall River, New Bedford, Taunton and Providence. The increased demand in these cities and large towns for agricultural products has no doubt stimulated the farmer to produce the greatest possible amount of such crops as he thinks will pay the best. It has also given rise to the important inquiry, viz., What crop, all things considered, will yield the greatest net profit?

Less ground is cultivated than formerly, with more manure and cleaner culture. The result, of course, is better crops with less expense.

A marked improvement in the modes of cultivating and harvesting crops is visible in all parts of the county. The scarcity of labor during the late war has forced into very general use almost every implement calculated to facilitate the operations of agriculture. Owing to the unprecedented drought in the autumn of 1865, followed by an unfavorable winter, the English hay crop the past year has been unusually light, estimated at two-thirds of an average crop.

Statistics would seem to indicate that this crop has been gradually growing less for the last six years, and it may not be improper to briefly allude to the cause. From 1845 to 1860 our farmers appeared to have a perfect mania for converting bush pastures and low meadows into English mowings. This was effected at a moderate expense. The land was cleared, surface-drained, ploughed and harrowed the first season, and on the following summer the roots and stones were removed, and the plough and harrow were used until the soil became thoroughly pulverized, when it was heavily seeded with redtop, fine-top and timothy. About fifty barrels of menhaden fish were scattered broadcast at the time of seeding, which generally insured two or three heavy crops of good English hay.

About once in two or three years, it was found necessary to renew the application of fish, not only to keep up its productiveness, but to sustain the quality, for in such lands the English grasses tend to deterioration. In this way thousands of tons of

English hay were annually produced on lands which had formerly been considered worthless.

Fish could be had at the beach in large quantities at from fifteen to twenty cents per barrel, and about the only thing requisite to insure a crop, was to "fish the meadows." In 1860, this game played out. The discovery that a barrel of fish would make three gallons of oil, created a demand for them at one dollar per barrel, a price which farmers thought it impracticable to pay. The result is that many of those meadows have been abandoned as such, and are now used for pasture, while others are still mowed, producing a light crop of inferior quality, well mixed with brakes and bulrushes ; and a few of them by frequent top-dressing retain their original productiveness.

In point of economy, we have been unable to find a substitute for fish. The loss of this cheap and important fertilizer, which has entered more or less extensively, into the production of almost every crop, during the last forty years, has led not only to the extensive use of the various specific manures, but to a more prudent husbandry of the resources within our reach, for improving and enlarging the compost heap.

The corn crop, as also the hay and potato crops, during the last year have suffered severely from the ravages of the *cut-worm.* Fields which in the early part of the season, promised an abundant harvest, yielded but an indifferent crop. The potato crop was far below the average, and suffered materially in appearance from the contributions levied by this invading legion.

The crop of hay, particularly in the northern part of the county, succumbed to their blighting influence, and hundreds of acres consequently had to be ploughed and reseeded.

Market gardening is carried on quite extensively to meet the increasing demand, and where the market is near, and the soil is suitable, is very profitable business.

The onion crop is yearly increasing in importance, it being one of the very few, of which there is a surplus raised in the county. The crop of 1865, as shown by statistics, was 24,700 bushels, 10,500 of which was raised in the town of Somerset.

The crop of French turnips was of excellent quality, and exceedingly large, estimated by good judges to be double that of last year, which would make the crop of this year something over 200,000 bushels. Although it is generally believed that this is a very exhausting crop, yet farmers are slow to abandon it. Our soil and climate seem to be specially adapted to their growth; it is easily raised, requiring attention when most other hoed crops are out of the way, and yields a greater net profit than any other which admits of planting so late in the season.

I have been unable to collect any statistics in regard to blood-stock. An earnest desire however seems to prevail among our farmers generally, to improve their stock, and the most of them have so far "conquered their prejudices," as to be willing to pay liberally for the services of a thoroughbred bull. Some attention is given to the feeding of oxen for beef. This has been done very successfully, if not always profitably. A pair fed by Mr. Jonathan Slade, of Somerset, compared favorably with the *best*, exhibited at the New England Fair at Concord. Mr. Israel P. Brayton, of the same town, is now feeding an ox raised by himself, whose weight is 3,500 pounds, and is perhaps the best ox in the State, if not the best in New England.

AVERY P. SLADE.

This Report was accepted.

On motion of Mr. DAVIS, the following preamble and vote were adopted:—

Whereas, The State Board of Agriculture is of the opinion that the legislature intended, in return for the bounty granted to the agricultural societies by the State, that the societies should, by their printed reports, as well as by other means, furnish to the people valuable information concerning the subjects for which premiums are offered by them; and

Whereas, Their reports are generally deficient in this respect, owing principally to the neglect of committees in elaborating their reports to the societies by describing more fully the objects in competition, the reasons of success or failure;

Voted, That the several agricultural societies receiving the bounty of the State, be required hereafter to offer, annually, *three premiums* of not less than eight, six and four dollars, respectively, for the best reports of committees who recommend the awards of premiums.

A Report was then submitted upon

THE DAIRY.

BY N. S. HUBBARD.

The product of the dairy in its various forms, whether it be milk direct from the cow, cream, butter or cheese, constitutes a great luxury, furnishing, moreover, a large part of the sustenance for the support of the human family. Besides this, in many localities, it constitutes the principal revenue from the farm, which renders it a subject of no ordinary interest to the farmer.

The great question that interests the dairyman is,—In what way can I dispose of the product from my cows with the least amount of labor, and at the same time be the most remunerative? This depends somewhat upon the locality of the farm. If it is where the milk can be taken directly from the farm to market, and the whole product be disposed of, no doubt this is the most profitable disposition that can be made of it. But in many localities there is a failure to do this. If it is not disposed of in this way, it is either condensed or manufactured into butter or cheese. To direct attention to any one of these modes exclusively, would not be wise. This will be somewhat regulated by the supply and demand for each.

For a few years past the attention of the Massachusetts farmer has been directed more particularly to cheese-making, and the best and most economical mode of manufacture, and one also that will secure better returns to the dairyman. In April, 1864, the first cheese-factory went into operation. At the present time there are no less than twelve that are in successful operation, viz.:—Two in Barre, two in Hardwick, one in Petersham, one in Warren, one in New Braintree, one in South Adams, one in Blandford, one in Westborough, one in Wilbraham, and one in West Brookfield. The last-mentioned one is more particularly a condensing factory, the surplus milk only being used for cheese-making. This number of factories will no doubt rapidly increase.

The mode of operation with the several factories in the various processes, from the time the milk is drawn from the cow until the cheese is ready for market, may be of some interest as well as profit to all who are in any way interested in the dairy.

I will not, however, attempt to give all of them, but selecting the one I am most familiar with, will give its various processes. The milk is taken to the factory on the morning of each day, (Sundays excepted.) Saturday night's milk is taken to the factory at night, and made into cheese, except the cooking process, which is done Sunday morning. This saves almost the entire labor of the Sabbath. The Sunday morning's milk is cooled and kept till Monday morning. The milk is strained into three-gallon cans and cooled each day before it is taken to the factory, as it is found to be better to remove the animal heat from the milk as soon as possible after it is drawn from the cow. The milk is again strained at the factory into tin vats, capable of holding six hundred gallons. Care is always taken that every article used should be perfectly clean and sweet. When the milk is all in, steam is applied, and the heat raised to eighty-two degrees, when the rennet is put in, also a small amount of coloring, to give the cheese a rich appearance. And here let me say that much depends upon the rennets, and their preparation, for it is impossible to give the cheese a good flavor if this is not carefully attended to. The strength of the rennet, and the quantity to be used is ascertained by trial. The milk should be thoroughly stirred before the rennet is put in, so that the cream may not separate from the milk, and also after, until it shows signs of coagulation; then cover up and let it stand from fifty to seventy minutes, when the curd is usually hard enough to cut. Enough rennet should be used to have the milk show signs of coagulation in about fifteen minutes. Cut the curd, first, lengthwise of the vat with a gang of steel knives, and then let it stand till the whey separates and nearly covers the curd, then cross the curd in the same way, and apply the heat, working the curd with the hands. Work gently at first, in order to retain the richness of the cheese. Heat to 88 or 90 degrees, then cut the curd about as fine as shelled corn. After cutting, draw off about half the whey, and stir again, and heat to 96 degrees, or 98, if the weather is cool. Stir the curds gently with the hands while heating, and until the temperature is even through the curd, then cover, and let it stand until hard enough to dip out and salt, which is from one to three hours, according to the weather and condition of the curd. Use two and one-half pounds of salt to one hundred gallons of milk.

After salting, put into the hoops, and let it stand a short time before pressing. Press lightly at first, and from one to two hours before bandaging. Press two days, if possible, and then remove from the press to the dry-house. Trim and dress the top and bottom. Let them remain several days before dressing the sides, to let them dry and prevent moulding.

To facilitate the turning and care of the cheese in the dry-house while in their curing process and preparation for market, they are placed upon ranges having two pieces of scantling placed at a distance of twelve or fourteen inches, and the cheese placed upon a cover like that of a box, and when turned another is placed upon the top of the cheese, so that it is turned without raising the cheese entirely; the bottom cover becoming the top one, is used for the next cheese, and so continued for the entire length of the range. The cheese remains in the dry-house from thirty to sixty days, and sometimes longer, according to the state of the market and the wants of the purchaser.

The larger part of Massachusetts cheese is sent to Boston market, although some is sent to New York, or to supply the smaller markets. Large quantities are shipped to foreign markets, and the demand for American cheese in Europe is steadily increasing; and it is said by Mr. Willard, (the agent sent to examine the foreign markets and collect information that would be of service to our American dairymen,) that there is at the present time no cheese in the English market that stands higher in the estimation of the consumer, or commands a higher price, if we except the chedder cheese.

Cheese by many has been considered simply a luxury, while they would allow milk to possess very nutritive qualities. Is it not true that cheese retains these nutritive qualities in a very condensed form, and becomes an economical article for food as well as a great luxury?

I have spoken of the vats in which the cheese is made. These are made of tin; and the ones I spoke of are of the capacity of six hundred gallons, placed in wood vats, with a space between large enough to place iron pipes one and one-fourth to one and one-half inches in diameter. This space is filled with water, and steam is forced through them to heat the water, which heats the milk and the curd in all its processes before it goes to press.

From the reports of last year, it appears that on an average a little over ten pounds of milk were required for one pound of cured cheese; and from what experiments I have examined, not far from twenty-two pounds are required for one pound of butter. These experiments on butter must have been under favorable circumstances, as it usually requires more milk for a pound of butter. With these figures and the prices of butter and cheese the past season, there would seem to be a preponderance in favor of butter. But there are more difficulties attending the manufacture of butter the entire season. We have as yet only one butter and cheese factory in Massachusetts, and that is in Westborough. I have no definite reports, but from what information I have, am led to the belief that the butter part has been a success; and the failure of cheese a part of the season was more a want of skill in the manufacturer than from any other cause. Mr. Willard, of New York, in speaking of butter and cheese factories, says some have proved highly successful, while others have failed; but that their failure was more a want of skill in their management than from any other cause.

Under the common dairy system, or mode of cheese making, it was more a matter of luck than otherwise, there not being an exact system by which it is managed in its various processes. Under the factory system it is reduced more to a science, the whole operation being carried on by exact rule, to be varied, however, according to circumstances, such as the weather, it requiring a little more salt when the weather is very warm; and sometimes hurried through its different processes quicker than at other times, owing to the condition of the milk. This must of course be regulated according to the judgement of the operator.

By examination I find there is a great difference in the product of different dairies, per cow; varying from forty to fifty-two or three dollars per cow, for seven months of the year. Some dairies averaged as high as seventy dollars per cow for the entire year; milk being sold when cheese was not made. There are reports from New York dairies that run much higher. But from our own reports we are led to the belief that farmers suffer great loss by not being more careful in their selection of cows. If the income from one cow is thirty or forty dollars per year, while another on precisely the same keeping reaches the sum of seventy or eighty, and sometimes much higher, it is very evident that it is the part of wisdom to prepare for the shambles the inferior dairy cow, and supply her place by one that will yield better returns. It is difficult to accomplish this at once, but with sufficient care there may be a great improvement in that direction.

Three factories, South Adams, Hardwick and Warren, have made 333,535 pounds of cheese the past season. The other factories have not yet reported.

I cannot give as many returns as I would like, showing the relative value of milk for the different purposes for which it is used. I will give the result of 371,892 gallons: 201,073 gallons were sent to market, and 170,823 were made into cheese. The result was that the milk sent to market brought $31,753.94, or $0.1579 per gallon.

This was $0.0192 per gallon better than the returns for cheese in the same town. This is based upon the entire year. But if we take the time the factory was in operation (seven months,) the milk brought for cheese $0.0096 per gallon more than the milk for market. This does not include any income for the whey, which is estimated at from four to six dollars per cow. In this case the balance would be in favor of cheese. But, as I have said before, all cannot turn their attention in the same direction.

NEWTON S. HUBBARD.
THOMAS BILLINGS.

The above Report having been adopted, it was voted to appoint a committee of three to consider and report upon the application of the Nantucket and other societies, for a change of time of holding their exhibitions. Messrs. Davis, Slade and Watkins.

This Committee subsequently reported to fix the time of these exhibitions

The Norfolk to begin September 19.

The Bristol Central to begin September 19.

The Nantucket to begin September 25.

The Report was accepted, and the time so fixed respectively.

TUESDAY, February 5.

The Board met at 10 o'clock, A. M., Mr. SMITH, of Sunderland, in the chair.

An Essay was submitted and read on

PASTURE LANDS.

BY JOHN JOHNSON, JR.

The management of pastures presents a subject of peculiar interest to every farmer. Grazing forms the most profitable and important department, but hitherto the most neglected of any on the farm.

Urgent inquiries are constantly heard from every part of the State in regard to pasture management, with the universally acknowledged fact that they are becoming, in a sad degree, exhausted and unproductive.

Our first endeavor should be to discover the causes upon which this deterioration depends; and having ascertained some of the more important of these, we can the more readily decide upon the most judicious course to pursue to insure a restoration of our pasturage to former productiveness.

One great cause of this impoverished condition is attributable to improper cropping and overstocking; thus constantly carrying away those elements from the soil necessary to the formation of bone, flesh and milk, while no adequate equivalent has been returned.

While the sunshine, air and rain constantly contribute largely toward securing a plentiful harvest, without the aid of an abundant supply of materials, similar to those which have been taken up from the soil, through vegetation in large measure, into the products of flesh and milk, these must be comparatively ineffectual.

No soil can long withstand close and continual cropping. Evidently by this process it is overstrained, and, at length, must become exhausted in those essentials which serve directly as nourishment for the growth and maintenance of the innumerable roots, leaves and seeds, of the various grasses.

The soil has thus generously parted with its salts in the production of vegetation, to supply the demands of grazing millions, dependent upon it for life and sustenance. In affording this incalculable supply, its stores in sulphates, nitrates and phosphates, have been largely exhausted; and, in order to reanimate its now slumbering energies, and renew its fertility, these must be restored.

We know that potash, soda, magnesia, lime, phosphoric and sulphuric acids, enter largely into the composition of grass. These, then, should in needed measure, be combined to form some of the essential restoratives which we must endeavor to supply to the soil when this important crop deteriorates.

In the use of certain proportions of unleached ashes, common salt, bone-dust and plaster, this object may be in a great degree attained. I would not say that it is, in any case, absolutely necessary to supply all the constituent principles of grass to the soil at *one and the same time;* for we know that the earth is a great store-house and laboratory, in which important chemical changes are constantly taking place, producing the various combinations which enter into vegetable life; and that she is furnished more abundantly with some of these essentials than with others; and hence her need of an artificial supply of some one or more of these will soon occur. But I would say, that in so far as she becomes exhausted or weakened, in any considerable measure, in any of these materials, they must be promptly and efficiently restored by the hand of art and science.

When we remember that every blade of grass that grows takes up a certain portion of these substances from the soil, and consider the innumerable millions that have been nourished through more than a century, and are now growing, it becomes obvious, and needs no argument to show, that, if she is not proportionately compensated, vegetation must necessarily famish, and man and beast, so far as they depend upon this production, suffer immeasurably. We should not forget that nature is never false to us, nor stingy in her products; but, with the necessary supply of food for her operations, she will abundantly satisfy every reasonable demand.

Another fruitful cause of this deterioration is found in allowing brush-wood and brambles, foul grasses, and various noxious herbs and weeds to mature and scatter their seed over the land, which, taking root, have finally become the prevailing growths of the field. These must be entirely exterminated, root and branch, as they overpower and destroy all the finer, more delicate and desirable products, as we know they have already, on the face of many a once fair pasture.

For convenience, in speaking more particularly of the treatment of pasture lands, I will divide the subject into three classes, namely: high hills, easy rolling, and lowlands. What might be considered good husbandry for the one, could not be practised on the other. Many of our high hill pastures abound, more or less, in those foul and sour growths to which we have alluded.

Our first effort towards the improvement of all embraced in this class found worthy of being continued for grazing, is to get rid of those detestable and poisonous over-growths. How this shall be accomplished depends entirely upon location, the surface, character and nature of the soil. Many of these hills are very stony, and of such rugged and steep inclination that it is impossible to subdue them by the plough; therefore, we must adopt some other method. The first course suggested to my mind is that of stocking with sheep. Personally, I have had but little experience in sheep-husbandry. I will, however, state one fact which occurred on my farm.

A few sheep were purchased in mid-winter, and in the spring turned out with the usual increase in lambs, upon a small lot which had a large growth of briers on different parts, cut in the autumn previous, and a large, unfruitful grape-vine trailing on the ground. In a single season the sheep destroyed every vestige both of the briers and vine.

I have made some inquiries of those who have turned their attention to sheep-husbandry, and the testimony is that they exterminate all bushy growths more effectually than any other means employed.

In my boyhood, sheep were kept on farms to some extent in Framingham; and for many years after the sheep were abandoned and cattle substituted, not a bush or wild plant was seen, but only a beautiful and luxuriant growth of grass adorned those pasture grounds, so effectually subdued and enriched by sheep alone. Those pastures, from neglect, are now sadly changed in appearance and productiveness. Instead of fine, nutritious grasses, once their pride, they now present an overgrowth of wild grass, bushes and moss.

I do not propose to discuss the question whether sheep may be profitable for our farmers to keep for mutton and wool, either in this or any part of the State, but as a means of reclaiming such pastures as cannot be subdued by that great subduer, the PLOUGH.

From long experience it is evident that mowing bushes will not eradicate them. That we may obtain the necessary feed for our stock in summer, and that our pastures may not become a wild, the bushes and other improper growths must be cut as often, at least, as once in two years, which, at the present high price of labor, will cost from four to six dollars per acre; or from two to three, if mowed every year. If we *only* mow, we must *re-mow* during our lives, and our land becomes no richer by the use of the scythe; therefore we shall leave a worthless inheritance to our children, and the more of the like we leave, the poorer will they be, if our example and footsteps are followed by them.

If we conclude to lay the scythe aside, but are still determined to *subdue*, while we *cannot plough*, our resort must be to the HOE. When this instrument is used, the roots must be cut about two inches below the surface of the ground. This will effectually destroy the shrubs. Having cut the bushes and other similar pests in this manner, and burned them, select a day just previous to a gentle rain, if convenient, applying some of the fertilizing agents mentioned, and re-seed, using a harrow for the purpose, if possible. This method for small patches, at least, will be found a profitable means of subduing and improving some lands.

Many of our pastures might be much improved by receiving a new supply of grass seeds of the best varieties; and this, in many instances, will be absolutely necessary to obtain, by the application of fertilizing combinations, a satisfactory result.

The use of the hoe for large tracts of land would be rather expensive, but far better and cheaper in the *end* than the everlasting and inefficient operation of the scythe.

But will not sheep be a far better and still cheaper means than either of those instruments for the farmer to employ? At the present time sheep may be purchased for from two to five dollars each; and this quality will be as effectual for mere purposes of subduing pernicious growths as those costing much more.

From five to seven sheep may be pastured on the same amount of ground required to keep one cow; she will never destroy the growing bushes nor prevent others from springing up. But turn out the five or seven sheep instead, and within five years, our bushy pastures, nearly worthless now, might become flourishing and valuable as in former times.

Sheep thus employed as substitutes for the scythe and hoe, which latter scatter no fertilizing products behind, are vastly more ready subduers, and, at the same time, leave a large amount of manure of superior excellence. Even the very plants and shrubs we seek to destroy by this means are converted largely into this valuable substance for the growth of the grass we need. Thus our pastures, many of them, may be made luxuriantly green and velvety as those lawns surrounding your dwelling-places.

May not this desirable object be accomplished by much less expense in the use of sheep than in any other manner, considering they will produce a few pounds of wool yearly, and a lamb or two each, the profits of which will nearly equal the product of a poorly kept cow, and this at no cost for mowing or manuring the land?

Irrigation is another method which may be adopted for the improvement of some pastures of this class, or any other favorably located, and needing moisture at certain seasons. This may be attained by the construction of a suitable reservoir at the most convenient point, with a conduit laid to discharge the water, accumulating within from rains from time to time, into a furrow leading along into other furrows running in somewhat parallel directions around the hillside. These furrows may be furnished with small outlets here and there, in a manner to distribute the water evenly as possible over the entire surface, thus securing an invigorating source of moisture to the soil in dry seasons, and those elements of fertility held in watery solution. The whole expense need be but trifling—only that necessary for the preparation of the excavation, the erection of a slight roof to conduct the water into it, and for laying the conduit and furrows.

Our moderately hilly or rolling pasture lands are usually our best and most fertile grazing grounds. These, except in rare instances, should never be broken by the plough, breaking up impairing their value.

This class are generally quite free from bushes and other foul growths prejudicial to fertility, and no particular complaint may be offered in regard to them, except they are in an unproductive state, some of the causes of which have been already hinted.

Should there be found on the surface of any of this class patches of bushes, wild grasses and brambles, more or less numerous, these should receive the same treatment previously recommended for such cases whenever they occur.

Here I would remark in general, that, for some of our cold, wet pastures, sloping northerly and westerly, upon which the influence of the sun is but imperfectly felt, some form of drainage might be beneficial; and it has been stated by some careful observers that the effects of *gypsum* are more decided on slopes of this character and inclination.

Shade trees are desirable on all pasture lands, both as an embellishment to the grounds and comfort to herds and flocks. These should be allowed to stand, or planted when none are growing, on the highest or least productive portions.

Some pastures included in this class might be benefited by harrowing the surface in early spring time, and scattering some seed anew, with the application of some fertilizing materials in form of dust or compost before indicated. But generally this class require only a fresh supply of seed scattered over them on the snows of spring, with an occasional dressing with appropriate compounds, together with rest once in awhile for a season. This course, with fair and judicious stocking, will insure an ample reward for our labor and outlay. Nor would just the amount of increase in grass thereby furnished for our animals, the profits of which we should receive in flesh and milk, be all the extra gain derived from this changed condition; but our stock would become permanently improved and their value enhanced, while, at the same time, their manurial products scattered over these acres, or accumulated for use on other lands of the farm, would be proportionally increased in quantity and quality; for the richer the food consumed the more highly nourishing to plants are all the excrements derived therefrom.

Judging by their management, many seem to think that manure is all the same from whatever kind of food derived, all the difference being that which distinguishes its animal sources, as from horses, neat stock, sheep, swine, &c., whether from healthful, fleshy, comfortable creatures, well cared for and fed, or from poor, miserable, half famished, neglected specimens. But this is a mistake.

If our pastures are enriched by affording the requisite elements for an abundance of highly nutritive grass required for the finest and highest development of our animals, a large proportion of the excellence contained in the food supplied will be found in the manure, and this must necessarily be of much greater value than that can be from animals grazing upon neglected pastures affording but a limited amount of that richness of nourishment conducive to vigor and strength. How important, then, in every point of view, that we turn our attention immediately to the renovation of our grazing lands, and adopt some new and more successful methods of improvement, those hitherto practised having nearly exhausted and ruined all; and especially when we reflect that without flourishing, fertile pasturage our herds and flocks, of whatever BLOOD, must inevitably languish and cease to yield a profit, while our farms, in other departments, must also deteriorate.

Lowlands may require a different treatment from either of the classes mentioned, but all have many demands in common. Those in this class overgrown with moss, coarse grass, ferns and and rushes, in root and in surface-soil most difficult of decomposition by the usual methods, and having a cold, insoluble base of clay, should be treated by a course of deep drainage, paring and burning, thoroughly harrowing, lightly manuring, spreading evenly the ashes over the surface, and seeding with those varieties of grass most desirable. This course may be adopted with the assurance of great success.

Ploughing and thorough cultivation, seeding in the usual manner, may be attended by similar good results; still I incline to the adoption of drainage, paring and burning as offering the best and most certain mode of subjugation of this variety, and the entire destruction of the seeds and roots of every mischievous growth by which it has been infested.

On smooth lowlands, producing already the desirable varieties of grass, some finely-prepared barnyard manure spread evenly over the ground, or the occasional sowing of some fertilizing agents recommended, will insure abundant and satisfactory crops. To practise a system of the rotation of crops on some of these lands might be, perhaps, attended by greater profits than stocking all of them permanently to pasture. It must be borne in mind, however, that in pursuing this system, rest, at least, during one year in five, is considered important, and that more labor is required, and a greater outlay in manure. But we must be guided in our management by the surrounding circumstances.

In all cases appertaining to seeding lands for pasturage, we should determine, as far as possible, for what use they are more particularly desired,—for fattening or for dairy purposes; because experience and observation have taught that the same pastures or variety of grasses do not produce meat and milk with equal facility.

The practice adopted by many farmers of mowing lands for the hay-crop, during two or three years immediately subsequent to stocking with grass, but intended ultimately for pasturing, is, in my judgment, highly prejudicial, and should be abandoned, devoting them from the first strictly for grazing.

Our newly-seeded grounds for pasturage should be cautiously fed, always endeavoring to leave some grass for seed, and a sufficient growth near the surface for the protection of the roots during seasons of drought, and from the destructive frosts of winter. Indeed, who does not know that a pasture, stripped of all its vegetation, and fed, as is often the case, so closely as to loosen many of the grass roots, will the next season produce but a small allowance of feed; but that, with prudent cropping, will yield an abundance of luxuriant food.

With wise and careful management in this respect, and with a sufficient quantity and a good quality of gypsum sown per acre, occasionally, as required, or its equivalent in weight of some other sustaining and invigorating agent of fertility, will preserve the productiveness of our naturally good pasture-lands to the end of time; and, certainly, for those having less of the original elements of vitality and energy, this peculiar caution and care is all the more essential.

In 1849, I purchased a small farm, divided, as usual, into pasturing and tillage. One pasture, containing five acres, sloping gradually north-easterly, with a gravelly soil abounding in small stones, was inclosed by a stone-wall and situated on the highest point of the farm. It was completely overrun by small bushes, blackberry vines, sweet fern and other foul growths, and generally known as "*Checkerberry hill*," checkerberries being its chief product.

In June, 1850, I ploughed it, employing four oxen and three men, completing the work in about twelve days. In September following, with the same team and the labor of two men, it was thoroughly harrowed by the use of the large harrow required for seeding land from which a recent growth of wood has been taken. In this condition it remained until the next spring, when I ploughed it again with one yoke of oxen to a plough, harrowing with a common harrow, and planted with potatoes, using nothing but good plaster in the hills, the rows being nearly four feet apart. The potatoes received one thorough hoeing with the breaking-up hoe, no plough being used. For the crop harvested I received more than two hundred dollars, retaining a quantity for home use.

The land was then ploughed and thus remained until spring, when again it was first harrowed and then ploughed once for the season, but no crop was taken from it. The spring after, it was ploughed and harrowed, the stones gathered to some extent into large heaps on the ground, and seeded to oats with the usual varieties of grass-seed, and a sprinkling of white clover. The oat crop was a complete failure; so much so, that I did not spend time to harvest all of it from the field. In the autumn I finished gathering the stones, which in all were estimated at five hundred ox-cart loads.

In the autumn the field presented a large and flourishing growth of grass, which was not fed, but suffered to remain on the root.

In the following spring it showed a thick and promising growth of red and white clover; and in June I turned my milch cows upon it to graze, but avoided close feeding, which practice was continued.

This pasture remained very productive in grass until four years ago, when, finding myself with a largely increased stock of milch cows, I departed from the *rule*, and suffered *close* feeding for two years in succession. Observing that my pasture was faltering, I immediately adopted, in a measure, the system of rest, by which I hoped, in some degree, to restore it to former productiveness.

I am fully of the opinion, that, for the space of four years, I have not received one dollar for the extra stock kept during the two years of close cropping mentioned, to say nothing of the reduced condition of the pasture.

I am confident that highly fed milch cows yield a large income, and are a source of profit; whereas, from those poorly kept a *small* income and no profit is received.

JOHN JOHNSON, Jr.

FRAMINGHAM, January 30, 1867.

This Essay, after some discussion, was laid over under the rules of the Board, but subsequently taken up and accepted.

The Committee submitted a Report on

PEAT FUEL.

BY GEO. B. LORING.

In the able and comprehensive report of Professor Hitchcock, made in 1833, by order of the legislature, upon the geological survey of the State, allusion is made to the vast deposits of peat which abound in many localities. In calling attention to these numerous storehouses of fuel at a period when wood was comparatively abundant in nearly all our inland towns, it is hardly to be supposed that he realized the day was so near at hand when the actual wants of an increasing population would verify his predictions as to their great utility and value.

After enumerating the various localities where peat was known to exist, and furnishing a tabular statement of the number of acres and thickness of the deposit in numerous localities, he remarks as follows:—

" Excluding the western counties, and taking the amount of peat, given in the statements to me, at a fair average in all the towns of the other counties, (excluding the large towns,) it would follow that *eighty thousand acres*, or one hundred and twenty-five square miles, are covered with peat in that portion of the State, having an average thickness of six feet four inches. This area and depth would yield not far from *one hundred and twenty millions of cords*. We hence get an enlarged view of the quantity of matter in the State that may be employed as fuel or in agriculture, that has hitherto, except in some limited districts, remained almost untouched."

WHAT IS PEAT?

There are few persons in Massachusetts who could not readily furnish an answer to this question; but, as there are several kinds of peat, varying in quality for fuel purposes as much as the several kinds of wood, it will be proper to describe them, so that the possessor of a bog may be able the better to judge of its value.

The peat deposits of Massachusetts are most commonly composed of aquatic grasses, mosses and other plants in a state of partial decomposition; and they are never found upon localities which are not, or which have not been, at some previous time, subject to the overflow of water. Both the plant and the root of the plant enter into the composition of the material. With each successive year the process of growth and partial decay goes on. The winter snows, the autumnal rains and the spring freshets help to consolidate the mass, and in course of time, where the location is favorable, these deposits attain the depth of many feet. It would be a mistake to suppose, however, that all the peat, even in the same location, possesses the same degree of density. Sometimes several distinct strata will be found upon the same bog; and it is by no means uncommon to find a light and spongy deposit of several feet in thickness near the surface; another of much greater density below it, and still another below that and near the bottom, which, when dried, becomes as light and fibrous as hay or straw.

The lighter peats, by reason of their rapid combustion and want of substance, do not afford a strong fire, and when not artificially mingled and consolidated with the more substantial portions of the bog, will hardly pay the cost of working.

Besides the variety of peat referred to above, deposits are not unfrequently found in the State, where ligneous substances predominate; and we have observed at Edgartown, and in some parts of Worcester County, deposits of several acres in extent, and of great depth and density, in which the peat seems to have been formed chiefly from the bark, limbs and trunks of trees. This description of peat is accounted the most valuable; and, where the pine predominates, it is said to take fire more readily, produce more heat, and maintain its combustion for a longer time than any other.

THE USE OF PEAT AS FUEL.

There are some localities in the States where peat has been used more or less as fuel for many years, and there are some families which having all the facilities for obtaining other kinds of fuel in abundance, would consider their winter arrangements for comfort incomplete, without a few loads of well prepared peat close at hand. At Nantucket, Martha's Vineyard, and some of the towns in Barnstable County, where wood is scarce, the inhabitants have found their peat bogs a source of great convenience and comfort; and the only thing needed to make them a source of profit everywhere to the owners, seems to have been the adoption of some cheaper and more rapid process for digging, shaping and consolidating it, than is usually pursued. And this brings us to a description of the various methods by which peat has been, from time immemorial, prepared for domestic use; and which are as rude as the ancient methods of treading out grain with the feet of men and animals.

THE OLD PROCESS OF PREPARING PEAT.

There are two processes of preparing peat for use, in this country, without the intervention of machinery, and the peats so prepared are designated by the names of slane peat and hand peat, respectively. The "slane" peat is so called from the name given to the implement which is used in its preparation, and which is said to be of Irish origin. It is simply a narrow spade, somewhat longer than the common garden spade, about five inches in width, and having a sort of wing upon the side at right angles to the blade; so that in working upon the face of the bog, from left to right, it cuts two sides of each peat at the same time. The spade, or slane, should be quite sharp, but not so heavy as it is usually made, and the same implement fashioned of wood and simply *shod* with cast-steel, of the thickness of a common saw-plate, will be found much preferable. The implement above described, a common spade, and a wheel-barrow are all the tools requisite for preparing peat fuel, where the object is simply to cut and dry it in the most expeditious manner for family use, without reference to its quality.

In some parts of Massachusetts, where but few attempts have been made to prepare peat for market on an extensive scale, but little attention has been given to the arrangement of a definite system of labor; and each owner of a bog has cut into his deposit with little regard to the economy of the proceeding, or the saving of material. But at Worcester, where the preparation of this kind of peat was entered upon about ten years ago, and where it has been successfully carried on up to the present time, the laborers have followed very closely the old country system which long experience had approved.

A description of this process would possess little value to any one at this time, for the reason that human ingenuity has in the application of cheap and effective labor-saving machinery to this object, demonstrated a better way. Another method of preparing peat fuel which we have seen adopted at Worcester, Nantucket and other places, and by which an article of greater density, and one in all respects superior to "slane" peat is produced, deserves a passing notice. We refer to what is known as "hand peat." In the preparation of this, no attention is paid to the form or size of the peats, and but few tools are requisite; the object being to reduce and mingle all the material thrown out into a pasty, incongruous mass. To facilitate the operation, water is bailed or pumped up from the neighboring ditches and freely distributed upon the freshly dug peat; while at the same time, a portion of the hands are trampling it with their feet and beating it with shovels. In this way, the solid, compact peat, and that also which is light and fibrous, are blended together, and when the whole is reduced to the consistency of mortar as used by brick-layers, the mass is permitted to remain a few hours until partially drained. It is then moulded by hand into loaves, about a foot in length, and six inches in width; the whole, presenting the appearance, except in color, of the loaves upon the floor of a baker's oven. In good weather the shrinkage caused by the evaporation of the water is such, that in forty-eight hours, these peats readily separate and may be piled up into small ricks, in which state the drying process goes forward with great rapidity. Sometimes this process is varied by drawing a harrow across the bed of freshly dug peat; the teeth of which, together with the trampling of the oxen or horses, serve the same purpose of disintegration and admixture as the feet of men and the blows of the shovel. Instead of the tedious process of moulding the peats by hand, the bed, after being made as smooth as possible, is sometimes marked off with the "tines" of a pitchfork into squares, diamonds, or parallelograms of suitable size. Although the marks are made quite shallow, the exposure of a very few drying days, causes the peats to separate upon all the lines marked by the fork with great regularity, and, in this state they are piled into little ricks (in the same manner as the moulded peats,) so as best to receive the influence of the sun and wind. In about a week of good weather, peat prepared in the manner described above, may be piled in larger oblong heaps, and left to season upon the drained meadow or upland, until such time in the autumn as it may be convenient to house or cart it to market. Peat prepared in this way is considerably more expensive than the slane peat, but by reason of its greater density and non-liability to waste and crumble in handling, it is far more valuable. From some experiments made in comparison with wood of various kinds, it is found that a cord of such peat possesses the calorific value of about the same quantity of seasoned oak or maple wood; and it has found a ready sale in various localities where it has been prepared in this way generally at the same price and seldom with less than a dollar a cord of difference.

In both of the processes of hand-made peat which we have described, the loss in bulk and weight is very considerable, and it is safe to estimate that the average of peats are in these particulars diminished about seventy-five per cent. We are informed that at the extensive wire manufactory of Messrs. I Washburn and Moen, at Worcester, peat, prepared by both of these crude and laborious processes, has been found a cheap and valuable fuel, and it seems to possess properties so especially adapted to the annealing of wire, that those gentlemen have, during the last seven years, prepared not less than fourteen thousand tons for their own use, at a cost of about three dollars per ton.

PEAT MACHINES.

The utility of peat as a fuel, and its great importance in those localities in which it abounds, and where wood and coal are scarce and dear, have stimulated human ingenuity and mechanical skill to the utmost, in order to contrive a process of improving the quality and reducing the cost of its production. In Great Britain the nobility and gentry have vied with each other and with men in the more humble walks of life, to invent a process for compressing and drying peat—one which would improve the quality, shorten the time, and lessen the expense of its manufacture by the tedious process of manual toil; but generally with slight success. At first glance it would seem not to be a very difficult task to accomplish the separation of the superabundant moisture from the peat, as it is found in the bed; but repeated and costly experiments have demonstrated, that in the manipulation of peat, whenever strong pressure was applied to the material in its original state, particles of the peat itself would follow the course of the water through all the apertures provided for the escape of that element, clogging the machine and rendering it useless for rapid and effective work. Three of the best of these compressing machines were patented respectively by Mr. Slight, of Edinburg, in 1833; by Sir Niel Menzies in the same year, and by Lord Willoughby D'Eresby in 1836. All of them gave abundant *promise* of success at the time; but the author of the Rural Cyclopædia, published at Edinburg in 1855, declares that "all failed in effecting their object, in consequence of the extreme difficulty of retaining the peat while under great pressure; for this has always been found to escape through any aperture that would pass water, unless an envelope of coarse flaxen cloth be employed."

In the German States, where peat is almost the universal fuel, experiments in this direction seem to have been no more successful; and the invention of Mannhardt, which was applied upon an extensive scale in Bavaria, was found, upon trial, to be quite impracticable. He attempted to get rid of the water by means of strainers of hair cloth, stretched upon huge cylinders fifteen feet in diameter, and revolving in opposite directions; but although his machine was built at a cost of $8,000, it was very liable to get out of repair, and has ceased to be considered a success. In Hanover, Hungary, France and Switzerland many other laborious and ingenuous efforts in the same department of inventive research proved abortive; and to this day, upon the continent of Europe, the ancient Celtic method of digging and preparing peat, with some slight modifications, the result of local circumstances, seems to be that in most general use.

AMERICAN PEAT MACHINES.

It seems to have been reserved to American ingenuity to demonstrate to the world that it was adequate to master the eccentricities of a material which had defied the efforts of the most ingenious mechanics of the old world; and in our country, within the past three years, it has been demonstrated that we can take the lead in this important and difficult branch of industry, as we have done before, in the matter of reapers, mowing machines and other implements of domestic economy calculated to facilitate the labor of human hands and to lessen the strain upon human muscles. As a fuel, peat is always improved by condensation; and of course the efforts of all inventors have tended to the completion of a machine which would insure the *utmost density* for the peat when dried. The simplest form of mechanical contrivance, applied to peat, is the common "pug-mill," such as is used in preparing clay for the brick-maker. It is found that even this simple operation greatly facilitates the drying process, and produces peat of more uniform density than can be produced by the methods already described, in which the manipulations are performed exclusively by hand-labor. But inasmuch as the peat must be removed from the mill in a wet state, carted to the dumping ground, and then fashioned in the usual manner of working hand peat, but little is gained in the economy of labor, and other machines have been invented which combine the three processes of grinding, compressing and moulding the peat into blocks of convenient size.

In 1865, Mr. S. Roberts, of Pekin, N. Y., invented a machine for which much is claimed. We have no reliable knowledge whether at this time the sanguine expectations of the inventor have been realized; but from a recent letter written by him to a gentleman in Connecticut, we learn that the operation of digging the peat, feeding it into the machine, and carrying it to the drying ground, is performed by steam-power, derived from a twenty-horse engine. This machine, with all the apparatus complete, costs $4,000 at the manufactory, and the purchaser is required to pay a royalty of fifty cents per ton. Its capacity is said to be equal to the production of twenty-five tons per day.

During the past summer the manufacture of peat has been conducted on a somewhat extensive scale at Lexington, in this State, by separate companies, operating the two rival machines known as the "Leavitt and Hunnewell" and the "Betterly" machines. Both of these machines produce excellent peat fuel, which, we are informed, sells readily upon the bog, where it is made, at eight dollars a ton; but of their real or comparative merits we are not sufficiently informed to express an opinion. Machines built under both of the above-named patents have been in operation during the past season in several other localities in the State; but of the result, as far as pecuniary profit is concerned, we have no reliable data, other than the fact that all the peat manufactured has found a ready sale.

In the vicinity of Springfield a machine constructed upon principles quite different from either of the above has been operated during the past season. It is known as the "Leet machine," and one of its peculiarities is an arrangement for *separating* the fibre from the denser portions of the peat. It is doubted by some if this feature gives the machine any advantage; but without pretending to decide the question, we will only observe that specimens of peat which we have seen of its production appear to be of excellent quality.

All of the machines alluded to in the foregoing pages require considerable motive power for their operation; varying from eight to fifteen horse, and an outlay of five thousand dollars is the lowest estimate we have seen for putting them fairly at work. A considerable outlay it is true, but yet not one to deter an enterprising man or company from investing in the business, if, upon careful examination, it appears that the results claimed by the inventors can be realized.

Another competitor for the favor of the public is known as the "Rae Patent Peat Machine." It was invented in New York, by Dr. Rae, of Syracuse. It has been in use during the past season in the States of Wisconsin and Illinois, and comes to the East highly recommended. The Ames Plow Company, of Boston, control the entire right to manufacture and sell in all the New England States. This machine is very simple in its construction. It dispenses with the use of movable moulds. These machines are built of different sizes and capacity, from one which can be operated by a single horse-power, and producing four or five tons of dry peat per day, to that which will require an engine of five horse-power, and produce from fifteen to twenty tons in the same time. The outward form of the large sized machine is that of a cylinder four feet or more in length, with gearing on one side at the bottom, and on the other side copper tubes from which the prepared peat is forced. The inner machinery consists of a vertical shaft revolving in the centre, carrying wings set spirally, so as to force the peat downwards into contact with stout revolving arms furnished with knives. These knives thoroughly pulverize the peat, and set diagonally, also force the now homogeneous mass downward, where it is still further forced by a spiral propeller through the delivery tubes. These tubes, two in number, decrease in size so as to compress the peat before it leaves the machine. The spiral arrangement by which each part of the machinery performs its work and passes the peat onward, is completely and very neatly carried out, the compressed and finely ground peat being delivered upon endless belts in continuous cylindrical rolls of any desirable length.

All of the machines, heretofore described, are designed for the manipulation of peat in its ordinary state, just as it is taken from the bog; but there has been in operation at Belleville, N. J., during the past summer, a more expensive and complicated machine, invented by Dr. Elsberg, and bearing his name. This machine is designed to prepare peat in such a way as to save the time usually occupied by the tedious process of drying the wet blocks, after their delivery from the machine. Accordingly, the surface of the meadow is harrowed so as to expose the disintegrated peat on the surface, to the sun and wind. This air-dried peat is then supplied to the machine, where it is subjected to a current of steam, and then to the action of powerful presses, from which it is delivered in cylindrical cakes, of a density equal to that from peat machines, which manipulate the wet material *after* it has undergone the process of drying. The Elsberg peat is almost dry enough for use when it comes from the machine, but it does not bear exposure to the action of the rain without crumbling as does peat prepared by the other methods described, and all accounts agree that it cannot maintain its solidity when exposed to the effects of a strong draft. Notwithstanding these defects, however, a company has been formed in New York, with a capital of half a million of dollars, having in view the working of an extensive bog in Rhode Island, the coming season, with this machine, and the supply of the

Blackstone Valley with fuel, at a greatly reduced cost from that at which it is now attainable.

ECONOMICAL ADVANTAGES OF PEAT FUEL.

Through the facilities afforded by such machines as we have already described, or which may be brought into use hereafter, it seems that the period is not very far distant when it is to be hoped that the people of Massachusetts will realize the value and importance of the immense deposits of fuel within the borders of their own State, and hasten to enjoy the advantages to be derived from its preparation for use. Should the question arise, as it doubtless will, in many minds, why a material possessing so much value and importance as peat, should have been so long neglected and overlooked, even in localities where wood and coal are scarce and dear, our reply must be, that the fulness of time had not arrived for their development, until American mechanism had triumphed over the obstacles which prevented its *economical* production. It seems to us, that precisely in the same manner, if not in the same degree, that the inventive skill of Eli Whitney enhanced the value of lands adapted to the growth of cotton, and gave an impetus to the agriculture of the country, such as it never received before or since ; that the application of suitable machinery to the immense deposits of excellent fuel which lie all about us, is destined to work out similar grand results. Peat in the bog, dependent upon hand labor alone for its preparation and development into fuel, is as valueless as cotton in the seed before the days of the cotton-gin. But with the aid of proper machinery and steam-power combined, it may, in a very short space of time, be converted into a marketable commodity at a handsome profit, and having a specific value like that of all the other productions of our fields, forests, and mines. The peat question has, in our opinion, passed the experimental stage. We take it for granted that the people have no need to inquire what it is good for, because the adaptability of condensed air-dried peat to all the domestic purposes for which coal and wood are used, has been so completely demonstrated during the past few years in so many different localities. In saying this we do not intend to convey the idea that peat fuel is to drive coal and wood out of the market, but we do say that it is capable of furnishing a cheap and convenient substitute for either, and adding immensely to the natural resources of the State. We are a manufacturing people, and cheap steam-power is one of the most important elements of the growth and prosperity of our industrial communities. To feed the iron horse, our forests have been cut away to such an extent that the price of wood, notwithstanding our large importations of coal, has doubled during the last twelve years. And coal can only be supplied to the towns in the interior at a cost for freight which so enhances its price as to make its use a burdensome tax upon all who rely upon steam-power to drive their machinery. Now it so happens that there is scarcely a manufacturing community in the Commonwealth where peat of good quality is not found in the immediate neighborhood, sufficient to supply the wants of the people for many years. In some localities, centuries would not exhaust the supply, and this too, of a fuel which is especially adapted for the production of steam-power, either in stationary or locomotive engines as we shall proceed to show by the recital of well established facts, derived from our own knowledge and from various authentic sources.

In 1856, trials were made upon the Worcester and Nashua Railroad, with common hand-made peat. A freight train consisting of thirteen heavily loaded cars was driven from Worcester to Groton Junction at a rate of speed that was entirely satisfactory, and with so small a consumption of fuel as to demonstrate that in economy of expense it had a decided advantage over wood. No change was made in the fire-box of the engine, and no difficulty whatever was experienced in its use. The steam-gauge through the whole trip indicated a pressure of nearly a hundred pounds to the square inch, which was better than the average attained by the engine used, even with wood of the best quality.

Another trial of crude peat, sun-dried and without condensation, was made upon the New York Central Railroad January 3, 1866, and is thus reported by the master mechanic who had the experiment in charge :—

" *Trial of peat made January* 3, 1866. *Engine No.* 248, *built at Schenectady Locomotive Works.*—Left Syracuse at 8 o'clock and 40 minutes, (40 minutes behind time,) with 25 empty 8-wheel box freight cars. Started with 120 pounds steam ; the engine worked well and took us along pretty sharp, as we made up the 40 minutes in going 25 miles, and arrived at Port Byron on time. The steam did not run below 120 pounds any of the time, and was often from 125 to 130 pounds. When the engine was working the strongest she would steam the best.

"We made time all the way very easy, although we had a strong head wind all the way, and snowing at times quite fast, and very cold. We took on a trifle over four tons of peat at Syracuse, which was all we had. We could have run to Fairport with it (71 miles,) if we had not been detained at Palmyra about one hour and a half. It gave us as much steam as wood, and burned a beautiful fire. Our trip was a perfect success, and I am sorry that there were not more present to witness it. We used a coal-burning grate that we could shake and get the ashes out of the furnace.

"I am confident that we can use peat in locomotives for fuel, or for stationary engines with the peat properly cured and the right kind of grate used for burning it in.

"Yours truly, H. Watkeys, *Master Machinist.*"

A similar trial, a little later, on the Hudson River Railroad, was equally satisfactory.

The "Hartford (Conn.) Press" closes its description of a visit of a party of gentlemen to the Ætna peat-works near Berlin:—

"The train was drawn by the 'C. F. Pond,' burning peat that was not thoroughly prepared. A speed of forty-five miles an hour was attained over a portion of the road without difficulty. The fuel question is not yet entirely settled, but experiments thus far point to complete success in the use of peat, and we shall yet see the time when the swamps of New England will yield a crop as valuable as that produced from her most fertile fields."

From a work upon "The Nature and Uses of Peat," written and published by J. H. Benham, Esq., of New Haven, we copy the following account of a trial of peat for locomotive fuel recently made in that vicinity:—

"On the 2d day of June, 1866, a trial was made on the New Haven, Hartford and Springfield Railroad. A coal-burning engine, fired with peat, drew a train from Hartford to Springfield, making 'express time,' the steam being made so much faster than usual as to be constantly escaping. The peat was cut from near the surface, and simply dried in the old way; yet a ton and a quarter was found to have produced as much steam as a ton of coal."

The experiment was considered highly satisfactory; but there can be little doubt that it would have been much more so if the peat used had been brought into a more condensed form.

Reports of similar experiments, which have appeared from time to time in the scientific journals of foreign countries, seem to confirm the results which we have already cited.

In an able and interesting treatise on the subject, by Mr. T. H. Leavitt, published in Boston last year, there is condensed a vast amount of useful information derived from these sources, of which all persons interested in the subject may readily avail themselves.

A copy of the "London Engineer" of recent date states that at a meeting of the Society of Engineers, at Exeter Hall, a paper was read by Mr. P. F. Nursey, in which it was shown that "the cost of *condensed* peat did not exceed that of coal at the mouth of the pit, and that it possessed some qualities superior to coal, especially its heating power. A trial of the condensed peat had been made by Mr. B. Fothergill on a river steam-boat, in which 12 cwt. were consumed in two hours twenty minutes, the ordinary consumption of coal being 12 cwt. per hour. The peat gave no smoke and left no clinkers. The locomotive engineer of the Belfast and Northern Counties Railway had tried the condensed peat on that line. In a trip of seventy-four miles, the total quantity of fuel burnt was 14 cwt., one-quarter, fourteen lbs.—the train, including engine and tender, weighing seventy tons. The time occupied was three hours nine minutes. The trial proved satisfactory. An analysis of the peat by Mr. Rickard was given, which showed it to contain but a trace of sulphur, and no phosphorus, which rendered it peculiarly adaptable for iron-smelting and other purposes, where the presence of either of those bodies was so pernicious."

Particulars were also given of an experiment, on a practical scale, by Mr. G. Murrall, at the Creevelea Iron Works, Leitrim, in which condensed peat was used for smelting iron ore. The iron was equal to any charcoal iron.

The following statement, from the "London Mechanics' Magazine," affords additional testimony in confirmation of these interesting and important results:—

"The locomotive superintendents of three railways in Ireland made a trial of condensed peat, on the Belfast and Northern Counties Railway, to test its fitness for locomotives. During a trip of twenty-seven miles there was an excess of steam, though the fire-door was continually open and the damper down for the greater part of the distance. The pressure at starting was 100 lbs. The commencement of the trip was up an incline of one in eighty, four miles long, with double curves. While ascending this incline, the pressure rose to 110 lbs., and afterward to 120 lbs., with the fire-door open. The speed was forty miles per hour. While running, there was no smoke, and little at the stations. The fire-box was examined at the end of the trip, and very little clinker was found, and the smoke-box was free from cinders and dust—a proof that the fuel had stood the blast well; and it is the recorded opinion of the experimenters that the peat was, in every respect, well suited for locomotives."

During the past season some careful experiments have been made to test the utility and comparative value of condensed peat as fuel for stationary engines, by Edward Atkinson, Esq., of this city, and we give the following as the result of his investigations.

Mr. Atkinson informs us that at the Indian Orchard Mills, five miles from Springfield, the experiments in manufacturing peat were made late in the season and imperfectly carried out. In consequence of the unusual rain-fall in August and September he was able to make no absolute or scientific tests in comparison with other fuel as he desired; but he authorizes us to state that the trials made were so far satisfactory that "the company expect to manufacture their own fuel hereafter from their own bogs, rather than to pay five dollars a cord for mixed wood of fair quality delivered at their mill."

The following letter on this subject, addressed to Thomas Drew, Esq., has been placed in our hands, and will be read with interest:—

"LEWISTON, Me., February 7, 1867.

"DEAR SIR:—Yours of the 4th is at hand. In answer to your inquiries, I would say that I did not commence to manufacture peat fuel until about the middle of August last. I manufactured in all about one hundred and fifty tons, using Leavitt's machine, which I find will turn out, on the average, eight tons of dry, or thirty-two tons of wet peat per day.

"The cost of manufacturing does not exceed three dollars per ton, which will cover the cost of labor for taking it from the bog, manufacturing and drying; also the interest on the cost of machinery and buildings and losses from all ordinary accidents.

"I use some $20,000 worth of fuel per year, and have tried wood, coal and peat, and consider that when hard wood is worth six dollars per cord, coal is worth nine dollars per ton, and peat eight dollars per ton for making steam. It would perhaps be better to state that I am not interested in any peat machine, or in the sale of any peat in any form.

"Yours, &c., N. W. FARWELL."

Mr. Leavitt, in the same work from which we have already quoted, gives the following additional testimony as to the value and economy of peat fuel:—"N. F. Potter, Esq., of Providence, R. I., President of the Narragansett Brick Company, informs us that he has used peat under their large boilers for several months, with highly satisfactory results as to its heating properties, and at a large reduction of expense as compared with wood or coal. They are now making preparations to manufacture it on a large scale."

Many other illustrations could be added, all equally satisfactory as to the practicability and economy of using this class of fuel. In regard to its use as an article of domestic economy and comfort, even when prepared in the rude old method of the Irish peasantry, and which until recently was the only method adopted in this country, there is also a great deal of favorable testimony from persons who have been accustomed to its use for many years. Prepared in that manner its heating properties are unquestioned, but because of its want of cohesion and liability to crumble when handled, it was not a favorite with housekeepers, as it "made dirt," and the finer particles, by temporarily clogging the fire, produced a smoke which was often disagreeable. But the peat we have seen and tested which has been condensed by the aid of machinery, and thoroughly dried, is an entirely different article; one, which even the neatest and most fastidious housekeeper would be proud and happy to possess in abundant supply. As a fuel for the cook-stove it seems to us that it cannot be excelled by any description of wood or coal. In the sick-chamber, too, it has an especial value, from the ease with which it is kindled, and the tenacity with which it retains fire ; while, in the open grate it burns with a brisk, cheerful flame, when first ignited, and afterwards, for a long time, with an intense glowing heat that is especially agreeable.

OTHER USES OF PEAT.

Having already alluded to the value of peat for domestic use, and for the generation of steam in locomotives and stationary engines, we wish now to present a few items of testimony from sources equally reliable, with the hope that they may serve as suggestions to the manufacturers of iron, in this Commonwealth, to study their own interests so far as to ascertain if similar results can be attained, from the peat bogs of Massachusetts, to those which have been realized by some of the iron masters of the old world. It has long been known that charcoal, of an inferior quality, could be made from blocks of peat prepared in the usual way, by the old methods in use before the introduction of modern machinery ; and such charcoal, poor as it was, was greatly prized in some localities where wood charcoal was unattainable, for forging purposes. The presence of sulphur in coal used in the smelting or forging of iron and in the annealing of wire is very prejudicial to the strength and tenacity of the metal ; and it has been found that condensed peat, and charcoal prepared from that material, produces iron equal in quality to that which is prepared by the exclusive use of wood charcoal. At "Platt's Iron Works," in Oldham, England, "peat charcoal was subjected to the severest tests, and produced a quality of iron so perfect as to admit of being completely doubled when cold, without exhibiting a single crack." At a meeting of the "Society of Arts" in England, a few years since, Mr. W. E. Newton, remarked, that "every iron manufacturer knew that if he could get good peat to stand the blast, that it was infinitely superior to coal for their purposes, for the simple reason, that it contained no sulphur. They could produce iron with peat from the worst brands which would almost equal the best Swedish and Russia iron." It is not at all unlikely that the superior quality of the iron and steel wires manufactured by Messrs. Washburn & Moen, of Worcester, is in a great measure attributable to the use which they make of peat, instead of coal in its preparation; their consumption of this kind of fuel amounting on the average to two thousand tons a year.

The difficulty of condensing peat so that it will "stand the blast," having, after so many experiments, covering a period of half a century, been at last overcome, its introduction has been quite rapid in those countries where peat abounds, and it is now used on a large scale for the working of iron in England, France, Bavaria, Italy, Hungary, Bohemia and other countries. Experiments made in England last year, of which we have reports, convinced some of the most scientific minds of the following: "That it is also equal if not superior to the best charcoal for smelting iron-ore; and its value for puddling has been demonstrated with equal certainty. At Konigsbron peat is used for puddling and refining pig-metal to make the finest German castings, which formerly required the best charcoal." This peat is not condensed by machinery, but is kiln-dried before using, in order to evaporate all the moisture.

We trust that enough has been said in the foregoing pages upon this newly developed branch of industry, to induce the farmers, manufacturers and capitalists of Massachusetts, to look carefully into the question of fuel supply which has so important a relation to the productive capacity of the State, and consider what may best be done to utilize the immense storehouses of peat that abound in almost every locality, and which need only the hand of intelligent labor, in combination with modern machinery and capital, to make them available as a permanent source of profit and convenience.

There would seem to be little need of sending so often to Pictou, Maryland and Pennsylvania, for our supplies of fuel, when we have at home a substitute for their coals which can be delivered at our own doors, at an average, as is claimed by the manufacturers, of one-half the bare cost of transportation of our supplies from those localities. We have a great home market for fuel, and we shall only follow one of the plainest principles of political economy if we turn our attention to supplying that market with the product of home labor, having the raw material in *exhaustless* quantities, close at hand.

QUANTITY OF PEAT FUEL PER ACRE.

And this leads us to remark that persons unacquainted with the subject can hardly realize how large a quantity of dry fuel can be taken from an acre of peat bog. Several estimates have recently been published as to the number of tons of dry fuel obtainable per acre, from each foot in depth, varying in amount from 350 to 1,000 tons. Some of these we know are unreliable, and from some experiments of our own we should prefer to state the quantity at no more than 250 tons for each foot in depth; but even at this rate a meadow four feet deep will yield *a thousand tons per acre*; a quantity quite sufficient to satisfy the desires of the most sanguine owner or manufacturer, considering its real value and its relation to the prices at which such lands may be bought in every section of the State. Of course, the quantity of fuel per acre must vary not only according to the depth, but density of the deposit in various localities, and any person who desires to be accurate may test the matter for himself. He has only to cut from his drained meadow a cubic foot of peat of average quality, carefully dry it until it reaches the condition fit for fuel, and ascertain its weight. Multiply the weight so obtained by 43,560, the number of square feet in an acre, and he will have the number of pounds per acre that the bog will produce from every foot in depth.

METHOD OF TESTING THE QUALITY OF PEAT FUEL.

As the difference in the value and quality of peat for fuel purposes is hardly less than that between the best oak or walnut wood, and the poorest quality of white pine, it will be useful for all interested in the subject to make their own experiments before incurring any considerable expense in preparations for its manufacture. The best proof of the value of a peat bog is in the manner and duration of its combustion, and the quantity of ash which remains by weight in comparison with the weight of dry peat before ignition. To ascertain these important particulars, peat should be selected from all the different strata that may exist, and from different parts of the bog, and each sample should be crushed, and consolidated by hand into balls of the size of the fist. The difference in their weight when dried and when taken from the bog, will show the percentage of water contained and the difference between the weight of the dry peat before burning and the ash that remains will give the weight of carbonaceous matter in the fuel, upon the abundance of which its heating value depends.

The most common impurities of peat are sand and clay, blown or washed in from the adjacent uplands; and an excess of these materials detracts from its value in the proportions in which they exist. Some of the best peats found in the State do not yield a residuüm of ashes beyond five per cent. of their original dry weight; while there are others which burn quite freely, and leave a residuüm of twenty per cent. Individuals and companies should ascertain all these facts beforehand, or they may acquire, at too costly a sacrifice, the knowledge obtained by one of the peat companies in the western part of the State, which, after providing itself with all the machinery requisite for an extensive business, found, when too late, that by reason of the excess of foreign substances in their raw material, the fuel made was almost valueless.

There seems to be but little doubt that in progress of time the peat-bogs of our State will be brought into use, and that for domestic purposes, as well as for stationary and movable engines, it will be valuable. At any rate, every careful experiment should be made in its manufacture and use; and we trust that another season will bring out additional facts, which will be valuable to the owner of the land as well as to the consumer of fuel.

The Committee desire to express their obligations to the gentlemen who have furnished them with many important facts in relation to the manufacture and use of peat, and they respectfully submit their Report.

Geo. B. Loring, *Chairman.*
James Thompson.
C. O. Perkins.

This Essay having been read a second time by its title, was adopted; when an Essay was presented upon

AGRICULTURAL EDUCATION.

BY C. O. PERKINS.

We assume that by Agriculture is meant the cultivation of the soil, so as to make it productive of the largest returns; and that, by Education, is meant the cultivation of the faculties, so as to enable them to reach the highest attainments. And who can measure the power which the educated mind has acquired, and is destined to acquire, over the material world? In the popular use of the term, agriculture includes the rearing and care of animals, and the growth and improvement of vegetable and cereal produce. And, in a similar use of the term, education implies the development and improvement of all the faculties of man. How, then, shall we best effect these ends? How educate men to become agriculturists?

Agricultural education does not receive its due share of attention in our institutions of learning. The branches of study which are chiefly pursued there have no tendency to create or foster a taste for agricultural life and labor. Yet, without such taste, no amount of school instruction will be sufficient to make the farmer's occupation pleasant or successful. If, then, we would promote agricultural education, we must first create a taste for rural life and employments. Socrates said: "Agriculture is an employment the most worthy the application of man; the most ancient and most suitable to his nature. It is the common nurse of all persons in every age and condition of life. It is the source of health, strength, plenty and riches; and of a thousand sober delights and honest pleasures. It is the mistress and school of sobriety, temperance, justice, religion; and, in short, of all virtues, civil and military." Franklin said: "The farmer has no need of popular favor. The success of his crops depends only on the blessing of God upon his honest industry." Washington said: "I know of no pursuit in which more real and important service can be rendered to any country than by improving its agriculture. A skilful agriculture will constitute one of the mightiest bulwarks of which civil liberty can boast." And others have said: "No class of society have within their reach so many of the elements of human enjoyment as the independent tillers of the soil." "Of all the occupations in which men engage for the purpose of gaining a livelihood, by the application of capital, there is none in which a large and varied stock of accurate knowledge is not only desirable, but so absolute necessary for obtaining the greatest returns, as in farming." "Of the various occupations and professions which have engaged the attention of mankind, there is not one which seems so permanently useful, so honorable; in short, so compatible with all our interests, as the cultivation of the earth; and none which calls for so diversified and general knowledge."

As a science, agriculture has no limits. It not only deals with soils, but with all that pertains to animal and vegetable life. To make agricultural labor popular, it must be associated with the highest degree of intelligence and the widest attainments in knowledge. There must be more employment of thought and less of muscular labor. We must promptly seize upon any new and useful mechanical improvement, by which labor will be lightened or made more effective. Every such improvement will increase the leisure of the farmer, and his ability, also, to supply his personal wants. "Knowledge is power," and the more extensive our attainments, the more easily shall we continue to acquire. The object of the farmer should be to increase the production and improve the qualities of animal and vegetable life, and to add thereby to the amount of his comforts and enjoyments. And this can best be accomplished by the acquisition of knowledge, which will give him greater power in his special employment, and, at the same time, a better position and more influence in society.

Agriculturists are the most numerous class in the community. Let them frown upon those who look upon labor as degrading. Let their influence be made to have its due weight in legislation, until their labor shall receive its proper reward. When agriculture shall be regarded as an intellectual employment, when its labor shall be as fully rewarded, and its invested capital yield as large returns as any other occupation, then will not only youth cherish a love of rural life, and age an attachment to the soil, but vigorous manhood, also, will find delight in the comforts and pleasures of a farmer's home. To encourage habits of industry in children, with particular reference to agricultural employments, will have a strong tendency to make them desire those employments. By allowing them the production or care of something which they may call their own, and by fostering their anxiety to rival the care and productions of others, we shall enlarge their powers of reflection and observation.

> "'Tis education forms the common mind,
> Just as the twig is bent, the tree's inclined."

"What things," said one, "do you think it most proper for boys to learn?"

"Those," it was replied, "which you wish them to practice, when they become men." "Train up a child in the way he should go, and when he is old, he will not depart from it."

Parents are not sufficiently aware how immense is the benefit which would result, in every way, from this encouragement of industrious habits in their children. Industry is, in fact, the great preventive of poverty and crime. Were it universally inculcated and fostered in youth, there would be much less need of doctors and lawyers, and, as we think, of ministers. Let children be intrusted with something which requires special attention and care at a given time. This would help to fix in them habits of reflection and order. I well remember my anxiety, when a small boy, to have something which I might call my own; something in respect to which no interference of others should interrupt or alter my plans. I remember that, when I was about nine years old, I gave my brother a half dollar to be allowed to call all the chickens my own, and have exclusive control and care of them. Then there was no divided interest, and their wants received increased attention. I also remember that my father gave me a small piece of land to cultivate, the crop from which was to be my own. Weeds were not to be found on that piece of land, and the potatoes which I raised were so large that twenty-six filled a half bushel measure. The end of a hog's trough reached through the fence, and, as it leaked, I was not slow to perceive the effect of a rich irrigation of my land. When I was twelve years old, I came into possession of a pair of calves. I allowed them to run with a cow until they were a year old,—feeding them, also, with potatoes which I had raised,—and their growth was really wonderful. Before they were two years old, I sold them for $42, to a man who was seeking to buy the best he could procure. This left me $7 after paying all expenses. Common, good oxen, were at that time worth $65 per pair.

I mention these things to show that boys should be encouraged to labor, and aided to act the man on a small scale; and, also, that they should be educated, as far as possible, at home. If sent away, for any considerable length of time, to obtain instruction, they will lose their interest in and love for the farm. Our system of district and high school education cannot be too highly appreciated by farmers.

The low estimate which farmers too often have of themselves and their occupation, is one of the surest barriers to the assumption of their proper position in society. It is easy to discern, the world over, an absurd prejudice against manual labor. But why is it that manual labor is thought degrading? Why is it that it is associated with the idea of meanness? Why does any considerable amount of education lift a man above it? Why do intelligent people shun it? Why is it an almost invariable rule, "The more work the less pay, and the less work the more pay?" Perhaps some may doubt or deny that things are as I have stated. But observation and statistics will confirm the truth of my assertions. And the reasons for this state of affairs are two-fold. In the first place, labor is associated with ignorance—and not without reason. Man makes a given force accomplish a greater piece of work in proportion as he is intelligent. He makes skill take the place of muscle. He obtains a better product with less labor. Make men intelligent, then, and they will find a shorter process for obtaining any result. They will become inventive. Secondly, labor, as it is generally associated here, is merely physical. Make it intelligent, and you will enhance its value, as much as mind is superior to matter. We yield to superiority of intellect, but not to brute force. It is mind that acts on mind; and, as this becomes enlightened, it prefers to be thus acted upon. And as mind is the motive power of man, who can measure the effect of one mind upon another?

We often hear those who pursue the law, medicine, and the ministry, spoken of as the privileged class in society. It is the privilege of the minister to be continually telling men of their failings and proneness to sin; that although the first human pair were perfect when placed in the Garden of Eden, they fell from that state of innocence; and hence the necessity for ministers. It is the privilege of the lawyer to become conversant with the vices and crimes, the wrongs and hatreds, of men; while the physician deals with the mental ills and physical ailments of humanity itself. But is the labor of the physician who visits all manner of disease and every loathsome ill, more cleanly than that of the farmer? Has the lawyer, who, for a piece of money, defends his client—even the thief or the murderer—from punishment, a clearer and more peaceful conscience than the farmer? Does the minister always lay his head upon the pillow at night with the feeling that nothing has been left undone, which human agency could do, for the salvation of his flock? It is indeed the privilege of these classes to live upon the depravity, the perverse will and the manifold ills of mankind; and whatever helps to increase the latter, helps, at the same time, to increase the need of the former. In one sense they are, it must be confessed, a privileged class, for they deal with minds; their knowledge of human nature is extended; their influence is increased.

We hear the farmers called the *producing* class. But, if there is a *privileged* class in the community, it should be the intelligent, independent farmers. They are privileged by their Creator in the enjoyment of those temporal blessings which are the natural result of sober, industrious and contented habits. It is the man that determines the dignity of his occupation, and not the occupation which measures the dignity of the man. Knowledge exalts. Ignorance degrades. Farming will be esteemed honorable just in proportion as it is associated with refinement and intelligence. Nor is it enough that we merely have knowledge. We must be able to impart it to others. Many farmers have native good sense without the power of using good language; and consequently they do not take that social position to which their good sense would otherwise entitle them. Speech is the grand distinction between man and the brute creation. But this is the result of cultivation and social intercourse. Laughter and tears, smiles and blushes, are instinctive acts of man. Our social rank depends very much upon our power of using correct language. An easy, fluent, graceful utterance gives one access to many social advantages; and these, in turn, afford aid to his utterance. It is not so much what we know that gives us power over others, as it is the ability to bring out and make use of our knowledge; and the ability to do this helps us, also, to draw out the knowledge of others. The ability to converse with force and clearness, with grace and propriety, should be, therefore, a part of the farmer's education. His isolation from society and his toilsome life render him liable to become coarse and awkward in manners and speech. Hence we observe one great use of farmers' clubs, farmers' festivals and agricultural fairs. Here his stock of knowledge may be enlarged, and with it his respect for his calling and his self-respect will be increased. His social powers will here be called into direct action. A clear expression of his thoughts will enable him to exert a greater influence upon others, and, at the same time, it will strengthen the distinctness of his own perceptions. He who can give the most intelligible expression of his ideas in the fewest words has the best command of language; and his command of language may be made more forcible by proper muscular action. There is a language in action, in the features of the face, in the expression of the eye—a language which speaks from the heart, and is beyond the utterance of the voice.

The farmer should improve, then, every opportunity to cultivate his social nature. It is the attrition of mind with mind which polishes and gives vital force to man. He must take time for social intercourse and intellectual improvement. Conversation is the great recreation of life, stirring us to activity, cheering us around our hearthstones, moving the heart gently, often deeply, crowding the memories of years into moments, and kindling the purest and happiest emotions.

The farmer has no good reason for discouragement. No nation or people on earth has ever equalled our own New England, in the rapid increase of knowledge, in the ability to seize upon and put into use every conceivable power and appliance by which the condition of man may be elevated, his capacities enlarged and his wants supplied. We have annihilated time and space. By aid of machinery, we make the labor of one man accomplish that of ten or a hundred others. The rapid strides, which the mass of the people are making in intelligence, refinement and self-respect, in all that adds to the comforts of life and extends the benefits of civilization, have been no less wonderful. With churches, we have district schools, high schools, academies, colleges, agricultural colleges, institutes of technology, natural history societies, literary and scientific associations, a State Board of Agriculture, farmer's clubs, agricultural fairs, and, above all, the pulsations of the heart of a civilized, cultivated, religious and patriotic people, beating in unison for the prosperous maintenance of all these institutions; and a State government, upholding, aiding and improving not only these, but all our humane, charitable, correctional and reformatory institutions. We ought, then, to be stimulated to increased mental action, and awakened to a just sense of the responsibilities that are resting upon us. We should feel individually, that we are liable to be outstripped by the industry, ambition and perseverance of others. We should none of us say or imagine that Providence has dealt hardly with us, or that our occupation is not blessed with His favor. The avenues to knowledge, wealth and distinction are open to all, and "he who strives may win."

Agriculture has furnished its share of the great men of every nation. Presidents Washington, Jefferson, Madison, Monroe, Jackson, Harrison, and Lincoln were farmers. But the farmer should not be ambitious of public preferment or popular favor. They who have sought the highest gifts in the nation's power, have often gone to their graves in disappointment and chagrin. Laboring for worldly preferment, another may reap what we have sown. But in agriculture, every one reaps the fruit of his own labors. And the thrifty farmer, who has the respect and esteem of the community of which he is a member, has no cause to envy the happiness of those who seek and gain the popular favor.

The farmer has constant, intimate and sensible relationship with Heaven. Living in close connection with nature, "he looks, through nature, up to nature's God." He stands, as it were, in the continual presence of a visible Creator. He knows that every effect must proceed from an adequate cause; and he turns his thoughts, from the works of nature, upward to the supreme, intelligent Originator of all. He enjoys a freedom from those selfish passions, which are so rife in crowded cities. Reason, reflection, conscience and a living charity, tranquillize all his feelings. His soul expands with noble emotions; and he stands erect in the conscious dignity of a man. His home is the abode of purity and peace. Religion hallows the very atmosphere he breathes therein. Mindful of that goodness which smiles in every morning and at the close of every day, he gratefully ascribes all that he enjoys to the blessing of God, and trustfully relies, for all that he needs, upon the providence of God. CHARLES O. PERKINS.

This Essay was read a second time by its title, and adopted.

WEDNESDAY, February 6, 1867.

The Board met at 10 o'clock, A. M., according to adjournment, Mr. Billings in the chair. Present, Messrs. Billings, Birnie, Chadbourne, Cleaveland, Clement, Cole, Hubbard, Hyde, Johnson, King, Knowlton, Loring, Moore, Porter, Sewall, Slade, Smith, Stockbridge, Thatcher, Ward, of Shrewsbury, Ward, of Monson, and Watkins.

Mr. Hubbard submitted the Report of the Committee on Credentials, as follows: —

The Committee on Credentials have examined the certificates of election of new members, and find the following to have been duly elected for three years :—

JOHN B. MOORE, by the Middlesex Society.

WILLIAM KNOWLTON, by the Worcester South-East.

H. S. PORTER, by the Hampshire, Hampden and Franklin.

WILLIAM BIRNIE, by the Hampden.

H. S. WARD, by the Hampden East.

ALEXANDER HYDE, by the Berkshire.

JOHN L. COLE, by the Hoosac Valley.

NATHAN DURFEE, by the Bristol Central.

Professor LOUIS AGASSIZ, of Cambridge, reappointed, and Professor WILLIAM S. CLARK, of Amherst, appointed by the Executive, in place of Professor CHADBOURNE, resigned.

This Report was accepted, and the above named members declared duly elected.

Mr. Chadbourne made a statement in regard to the Massachusetts Agricultural College, when it was

Voted, That a committee of three be appointed to consider the suggestions made by Professor Chadbourne. Messrs. Loring, Stockbridge and Smith.

Voted, That the connection of the Board with the Agricultural College, be referred for consideration to the same Committee.

This Committee subsequently submitted the following Resolutions, which were unanimously adopted : —

Resolved, That the Act of the Legislature, making this Board a Board of Overseers of the Agricultural College, makes it obligatory upon us, to give all the aid in our power in sustaining that institution, and in encouraging our young men to prepare themselves, to be scientific agriculturists.

Resolved, That this Board recommend to each agricultural society, receiving the bounty of the State, to establish at least one scholarship in the Massachusetts Agricultural College, either by a fund, or by stated appropriation from year to year, to be granted to some young man residing within the limits of said society. And that in the selection of candidates, preference should be given to such as propose to devote themselves to agricultural pursuits within the limits of said society.

The Board then proceeded to the

ASSIGNMENT OF DELEGATES.

Delegates to attend the agricultural exhibitions of the county societies were assigned as follows. To the

Essex,	H. S. Ward, of Monson.
Middlesex,	James Thompson, of Nantucket.
Middlesex North,	Wm. Birnie, of Springfield.
Middlesex South,	George B. Loring, of Salem.
Worcester,	L. Saltonstall, of Newton.
Worcester West,	J. M. Smith, of Sunderland.
Worcester North,	Alex. Hyde, of Lee.
Worcester South,	C. G. Davis, of Plymouth.
Worcester South-East,	H. S. Porter, of Hatfield.
Hampshire, Hampden and Franklin,	Thomas Billings, of Lunenburg.
Hampshire,	C. Sanderson, of Phillipston.
Highland,	A. P. Slade, of Somerset.
Hampden,	Asa Clement, of Dracut.
Hampden East,	J. Johnson, Jr., of Framingham.
Franklin,	L. Stockbridge, of Hadley.
Berkshire,	E. W. Bull, of Concord.
Housatonic,	Geo. A. King, of Barnstable.
Hoosac Valley,	D. A. Cleaveland, of Tisbury.

Norfolk,	Wm. Knowlton, of Upton.
Bristol,	J. L. Cole, of Williamstown.
Bristol Central,	M. F. Watkins, of Hinsdale.
Plymouth,	N. S. Hubbard, of Brimfield.
Barnstable,	T. D. Thatcher, of Lee,
Nantucket,	T. W. Ward, of Shrewsbury.
Martha's Vineyard,	C. C. Sewall, of Medfield.

Thursday, February 7.

The Board met at 10 o'clock, A. M., Mr. King in the chair.

Voted, That the country meeting of the Board be held at Concord, beginning on Tuesday, December 10th, at 12 o'clock.

Mr. Smith, from the committee to whom the subject had been referred, submitted the following Resolutions, which were adopted :—

Resolved, That in the opinion of the Massachusetts State Board of Agriculture, the Entomological Society of Philadelphia, by its researches and its publications, has exhibited a commendable desire to increase the amount of human knowledge.

Resolved, That the endeavors of this society to disseminate in an available form a knowledge of a most important branch of natural history among farmers and pomologists, we regard with great favor, and we specially recommend their publications and their gratuitous labors to the favorable notice of the community.

COMMITTEES ON ESSAYS.

Mr. Bull, from the committee appointed for the purpose, reported the following list of subjects for essays, which were assigned by the report of another committee, through its chairman, Mr. Moore, to the following committees, viz. :—

1. *Waste of Manures.*—Messrs. Loring, Sanderson and Billings.
2. *Nature's Methods of Distributing Plants.*—Messrs. Chadbourne, Watkins and Knowlton.
3. *Cultivation of Cereals in New England.* — Messrs. Thompson, Cole and Ward, of Monson.
4. *Location and Structure of Farm Buildings.* — Messrs. Stockbridge, Thatcher and Porter.

5. *Hedges and Farm Fences.*—Messrs. Slade, Hyde and Sewall.

6. *Fall and Spring Ploughing.*—Messrs. Ward, of Shrewsbury, Watkins and Birnie.

7. *Relation of Manufactures to Agriculture.*—Messrs. Durfee, Agassiz and Saltonstall.

8. *Drainage.*—Messrs. Porter, Hubbard and Slade.

9. *The Vineyard.*—Messrs. Bull, Durfee and Clement.

10. *Manure and its Application.*—Messrs. Smith, Johnson and Davis.

11. *Climate of Localities.*—Messrs. Clark, King and Cleaveland.

12. *The Hay Crop.*—Messrs. Hubbard, Moore and Stockbridge.

13. *Theory Applied to Practice.*—Messrs. King, Thompson and Durfee.

14. *Night Soil.*—Messrs. Clement, Sanderson and Knowlton.

15. *Improvement of Stock.*—Messrs. Johnson, Birnie and Thatcher.

16. *Specialties in Farming.*—Messrs. Moore, Slade and Sewall.

17. *Amending Soils by Mechanical Means.*—Messrs. Cleaveland, Cole and Hyde.

18. *Swine and their Diseases.*—Messrs. Davis, Ward and Porter.

19. *Effects of the Forest on Vegetation.*—Messrs. Saltonstall, Loring and Ward, of Shrewsbury.

20. *Fruit Culture.*—Messrs. Hyde, Billings, Smith, Bull and Clark.

21. *Preservation of Birds Beneficial to Agriculture.*—Messrs. Saltonstall, Smith and Moore.

These Reports were accepted and the list adopted with the committees to which the several subjects were respectively assigned.

Voted, That Messrs. Bull, Moore, Loring and the Secretary be constituted a Committee on Meetings.

On motion of Mr. Stockbridge, it was

Resolved, That a Committee be appointed by the Board to act as an examining Committee of the different classes of the Agricultural College.

This Committee was constituted by the appointment of Messrs. Loring, Hyde and Saltonstall.

Resolved, That the Secretary of the Board be instructed to remove the State cabinet to the Agricultural College, when the trustees of that institution indicate to him their readiness to receive and care for the same.

The State Cabinet was begun some years ago, with the design of illustrating as completely as practicable, through the limited means at command, the Natural History of this Commonwealth in all its branches. It consists of many thousand specimens of minerals, plants, fishes, reptiles, insects and birds, many of them rare and difficult to obtain, all of which have been collected within the State and arranged in a room connected with this office at the State House.

This collection has already accomplished a vast amount of good, attracted the attention and secured the co-operation of a large number of persons in all parts of the State, while, on the other hand, it has offered facilities for study and observation to those not specially conversant with the extent and variety of our natural history, and has administered to a laudable and elevated curiosity, and to the promotion of a taste for such studies among the young.

It is believed that in its present location, central and easily accessible as it is, it may be seen and studied by a larger number of persons than in any other. But the increase of business, and the increased wants of the various departments of the State Government, have made it necessary to furnish additional office accommodations and committee-rooms, and seem to require that the room now occupied by the collection should be given up. If the Cabinet is to be moved from its present position, it is eminently proper that it should go where it may accomplish the greatest amount of good—where its collections may be studied and used; and the Agricultural College, soon to go into operation in the town of Amherst, is better entitled to receive it than any other institution. It will no doubt be more fully appreciated there than it would be if merged in a vast miscellaneous collection, from the fact that it is, what its name implies, a State Cabinet.

A similar collection will be needed by the Massachusetts Agricultural College, and many years of labor would be required, to say nothing of the expense to be incurred, to build up such an one as the State Board has established at its office; for though it is not pretended that it is complete and perfect, it is not too much to say that it forms an admirable nucleus of a Cabinet which will be alike honorable to the Commonwealth and to the College.

The present prospect of the Agricultural College is promising and satisfactory. The current year will, no doubt, witness the construction of the buildings and the opening of the college to students. The liberality of public-spirited individuals has already been extended to the institution, and it is hoped that other donations will be made to establish it on a permanent and solid foundation, and to enlarge the various departments of instruction, beyond the limits which the present available funds permit.

The Annual Report of the Trustees of the College will be found in the Appendix of the second part of this Report, and reference is respectfully made to that for more complete information as to the plan of instruction contemplated by the government.

The year that has closed, the agricultural operations of which I have the honor to lay before you, has not been an eventful one to the farming interests of our country, or especially to this section of it. The charm of agricultural life is its stability and freedom from excitement or fluctuation.

The mysterious wire that during the past year has been made to connect in intelligence two continents, may flash across the information of disastrous battles, or of great events that lead the merchant or the statesman to shape their courses to meet new and unforseen contingencies, but the farmer quietly and steadily pursues and follows up his well matured plans, and in due time is pretty sure to enjoy in quiet the fruits of his labors.

Notwithstanding the drought of the two preceding years, to which I adverted in my last Report, had so affected the orchards and trees that the supply of fruit was limited in most parts of the State, the general productions of the field and the farm have been abundant, and a reasonable degree of prosperity has blessed the labors of the husbandman; while the prospects for agricultural progress and improvement are as promising as at any time during our past history. The true science of agriculture has probably never made so great advances in the same length of time as during the past year, and the future, therefore, is full of hope.

CHARLES L. FLINT,
Secretary of the State Board of Agriculture.

BOSTON, January 23, 1867.

APPENDIX.

FINANCES.

SOCIETIES.	Amount receiv'd from the Commonwealth.	Income of permanent fund.	New members & donations.	All other sources.	Receipts for the year.	Prem's offered.	Prem's and gratuities paid.	Current exp's—not including premiums and gratuities—for the year.	Disbursem'ts for the year.	Indebtedness.	Value of real estate.	Value of personal property.	Permanent fund.
Massachusetts, .	-	-	-	-	-	-	-	-	-	-	-	-	-
Essex, . . .	$600 00	$817 80	$123 00	$615 82	$2,155 62	$1,865 00	$690 75	$527 00	$1,117 00	-	$6,000 00	$1,000 00	$15,234 81
Middlesex, . .	600 00	91 85	298 00*	1,217 00	2,208 85	1,298 00	903 25	802 05	1,705 30	$2,000 00	7,500 00	2,000 00	9,500 00
Middlesex North, .	600 00	-	177 00	1,690 25	2,467 25	1,005 00	627 50	975 15	1,875 15	800 00	6,614 94	665 69	7,280 63
Middlesex South, .	600 00	-	1,561 94	1,328 67	2,490 61	1,028 00	506 46	3,061 19	3,567 65	2,000 00	9,300 00	1,100 00	10,400 00
Worcester, . .	600 00	-	190 00	3,263 01	4,053 01	1,492 25	1,377 00	1,386 45	3,398 99	5,000 00	22,000 00	500 00	10,000 00
Worcester West, .	600 00	-	219 50	6,063 52	6,883 02	1,375 00	902 86	5,050 57	6,803 69	5,561 88	13,850 00	716 68	8,288 12
Worcester North, .	600 00	451 65	244 00	523 00	1,818 65	1,477 75	826 99	706 35	1,533 34	-	-	5,586 24	5,586 24
Worcester South, .	600 00	358 18	220 00	141 50	1,319 68	916 00	623 95	630 72	1,254 67	-	2,300 00	2,113 58	3,552 00
Worcester So.-East,	600 00	187 00	529 00	2,005 66	2,078 75	1,164 75	417 80	466 55	7,340 77	4,500 00	8,500 00	638 82	4,000 00
Hampshire, Hampden & Franklin,	600 00	240 00	255 00	3,675 74	4,910 74	1,349 25	942 00	2,900 58	4,487 75	3,600 00	8,000 00	5,000 00	4,000 00
Hampshire, . .	600 00	559 92	46 50	14 15	1,220 57	987 00	643 66	679 93	1,323 59	-	5,200 00	945 00	5,645 00
Highland, . .	600 00	109 26	101 00	1,022 23	1,832 49	680 50	432 25	1,305 35	1,737 60	150 00	3,000 00	1,800 00	4,800 00
Hampden, . .	600 00	-	152 50	2,685 93	3,438 43	1,466 00	791 00	1,723 01	2,514 01	9,400 00	28,500 00	300 00	19,100 00
Hampden East, .	600 00	150 00	11 00	165 28	926 28	911 70	438 50	121 86	563 36	1,487 00	5,200 00	225 00	4,500 00
Franklin, . . .	600 00	100 00	273 75	1,016 27	1,990 02	697 50	621 50	746 99	1,888 49	-	7,000 00	1,000 00	8,000 00

Housatonic, . .	$600 00	$2,866 95	$169 34	$687 94	$4,323 33	$1,939 00	$1,699 00	$2,694 19	$1,408 19	$84 86	$9,000 00	$75 00	$20,000 00
Berkshire, . .	600 00	2,709 55	250 00	535 85	4,095 40	2,389 00	1,833 50	1,769 32	3,602 82	–	10,000 00	2,800 00	10,000 00
Hoosac Valley, .	600 00	150 00	267 00	1,021 30	2,038 30	1,149 50	823 00	995 43	1,818 43	2,800 00	7,000 00	135 60	5,000 00
Norfolk, . . .	600 00	–	6,675 00	3,017 21	10,292 21	1,549 00	436 00	2,928 09	10,247 55	1,000 00	10,414 00	–	10,414 00
Bristol, . . .	600 00	–	86 00	6,633 08	7,319 08	1,630 00	1,684 35	1,860 77	3,545 12	5,000 00	23,612 00	1,850 53	20,463 04
Bristol Central, .	–	–	502 00	3,607 43	4,109 43	1,330 75	1,306 50	1,438 75	2,438 75	4,762 72	15,253 50	1,000 00	11,490 80
Plymouth, . .	600 00	125 00	929 00	8,215 35	9,919 35	2,040 00	978 33	2,594 97	9,575 07	740 00	22,000 00	1,000 00	23,000 00
Barnstable, . .	600 00	40 00	–	773 40	1,413 40	770 00	450 36	905 85	1,356 21	800 00	6,000 00	300 00	6,300 00
Nantucket, . .	600 00	203 59	12 75	333 48	1,149 80	974 25	370 48	592 63	963 11	–	3,463 05	586·35	4,049 40
Martha's Vineyard,	600 00	504 87	175 65	150 27	1,430 79	924 50	617 40	409 53	1,550 56	265 00	3,465 00	2,617 20	6,022 20
Totals, . .	$14,400 00	$26,562 00	$13,498 93	$50,404 14	$85,885 06	$32,459 70	$34,934 39	$37,276 28	$80,617 17	$19,951 46	$243,172 49	$42,985 00	$236,626 24

* As donations the Society has received 30 acres of land from the citizens of Concord, and donations in money from other towns of about $2,500. The old lot of land and buildings were sold for $1,500.

Permanent Fund—How Invested.

ESSEX.—In bank stock, railroad bonds.
MIDDLESEX.—In real estate, fixtures, stocks, bonds, &c.
MIDDLESEX NORTH.—In land, buildings and personal property.
MIDDLESEX SOUTH.—In buildings, land, pens, fixtures, notes.
WORCESTER.—In real estate.
WORCESTER WEST.—In real estate, cattle pens, fixtures, &c.
WORCESTER NORTH.—In bank stock, U. S. bonds, notes, &c.
WORCESTER SOUTH.—In Agricultural Hall, furniture, cattle pens, &c.
WORCESTER SOUTH-EAST.—In real estate, cattle pens, fixtures, &c.
HAMPSHIRE, HAMPDEN AND FRANKLIN.—In bond and mortgage secured by real estate.
HAMPSHIRE.—In buildings and land in use by the society.
HIGHLAND.—In real estate, mortgage, U. S. bonds, &c.
HAMPDEN.—In park and buildings.
HAMPDEN EAST.—In real estate.
FRANKLIN.—In real estate and bank stock.
HOUSATONIC.—In notes and real estate.
BERKSHIRE.—In real estate.
HOOSAC VALLEY.—In real estate.
NORFOLK.—In real estate occupied by the society.
BRISTOL.—In farm and buildings, personal property, fixtures.
BRISTOL CENTRAL.—In real estate, farm owned by the society.
PLYMOUTH.—In real estate, furniture and fixtures.
BARNSTABLE.—In lands and buildings.
NANTUCKET.—In real estate, personal property, U. S. bonds, &c.
MARTHA'S VINEYARD.—In land, hall, fixtures and notes.

ANALYSIS OF PREMIUMS AND GRATUITIES AWARDED.

FOR FARMS, FARM IMPROVEMENTS, MANURES, &c.

SOCIETIES.	For managem't of farms.	For draining.	For subsoiling.	For ploughing at the Exhibition.	For reclaiming swamp lands.	For experiments with manures.	For spading.	For hedges and ornamental trees.	For reclaiming old pastures.	For orchards of all kinds.	For cranberries.	For other farm improvements.	Total am't offered for farm improvements.	Total am't awarded for farm improvements.	Total am't actually paid for farm improvements.
Massachusetts,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Essex,	–	–	–	$92 00	–	$15 00	–	–	–	–	$10 00	–	$317 00	$117 00	$112 00
Middlesex,	–	–	–	28 00	–	–	–	–	–	$30 00	–	$20 00	147 00	78 00	78 00
Middlesex South,	–	–	–	44 00	$15 00	–	–	–	–	–	–	–	133 00	59 00	59 00
Middlesex North,	–	–	–	46 00	–	–	–	–	–	–	3 00	–	–	–	20 00
Worcester,	–	–	–	56 00	–	–	–	–	–	–	–	–	56 00	56 00	56 00
Worcester West,	–	–	–	45 00	–	–	–	–	–	–	–	–	170 00	45 00	45 00
Worcester North,	–	–	–	48 00	–	–	–	–	–	25 00	–	62 00	192 00	85 00	85 00
Worcester South,	–	–	–	35 00	–	–	–	–	–	–	4 50	–	212 00	39 50	39 50
Worcester South-East,	–	–	–	59 00	–	–	–	–	–	–	–	–	171 00	59 00	53 00
Hamps., Franklin & Hampden,	–	–	–	–	–	–	–	–	–	–	2 00	–	20 00	–	–
Hampshire,	–	$20 00	–	–	–	–	–	–	–	–	1 00	–	107 00	21 00	21 00
Highland,	–	–	–	–	–	–	–	–	–	–	–	–	33 00	–	–
Hampden,	–	–	–	34 00	–	–	–	–	–	–	1 50	–	130 00	–	–
Hampden East,	–	–	–	19 00	–	–	–	–	–	–	–	–	182 00	19 00	19 00
Franklin,	–	–	–	–	–	–	–	–	–	–	–	–	50 00	–	–
Berkshire,	$50 00	–	–	43 00	–	–	–	–	–	36 00	–	–	139 00	135 00	135 00
Housatonic,	–	–	–	60 00	6 00	15 00	–	–	–	–	5 00	–	53 00	18 00	18 00
Hoosac Valley,	–	11 00	–	–	–	–	–	–	–	–	–	14 00	41 00	25 00	25 00
Norfolk,	–	–	–	86 00	–	–	–	–	–	–	–	–	363 00	86 00	78 00
Bristol,	–	–	–	99 00	–	–	–	–	–	–	–	–	274 00	99 00	99 00
Bristol Central,	–	–	–	85 00	–	–	–	–	–	–	50	–	230 00	–	–
Plymouth,	–	–	–	48 00	–	–	–	–	$12 00	–	–	–	116 00	60 00	46 00
Barnstable,	–	–	–	5 00	–	–	–	–	–	13 00	–	18 00	65 00	36 00	–
Nantucket,	25 00	–	–	7 00	–	–	–	–	–	5 00	–	–	88 00	37 00	37 00
Martha's Vineyard,	–	–	–	11 50	–	–	–	–	–	10 00	2 75	3 00	72 00	30 25	30 00
Totals,	$75 00	$31 00	–	$953 50	$21 00	$30 00	–	–	$12 00	$119 00	$30 25	$117 00	$3,351 00	$1,104 75	$1,055 50

FOR FARM STOCK.

SOCIETIES.	For Bulls.	For Milch Cows.	For Heifers.	For Calves.	For Working Oxen.	For Steers.	For Fat Cattle.	For Horses.	For Sheep.	For Swine.	For Poultry.	All other Stock.	Total am't offered for Live Stock.	Total am't awarded for Live Stock.	Total am't paid out for Live Stock.
Massachusetts,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Essex,	$31 00	$35 00	$29 00	$6 00	$65 00	$4 00	$23 00	$109 00	$19 00	$29 00	$15 00	–	$475 00	$368 00	$342 00
Middlesex,	20 00	71 00	12 00	5 00	18 00	–	16 00	270 00	–	32 00	15 00	$75 00	790 00	534 00	534 00
Middlesex North,	38 00	76 00	32 00	–	39 00	22 00	20 00	70 00	18 00	20 00	19 00	30 00	463 00	384 00	328 25
Middlesex South,	29 00	36 00	20 00	10 00	13 00	4 00	14 00	82 00	16 00	31 00	43 00	–	323 00	298 00	272 00
Worcester,	90 00	137 00	82 00	16 00	86 00	29 00	23 00	567 00	39 00	39 00	20 00	–	1,243 00	1,128 00	1,128 00
Worcester West,	47 00	50 00	21 00	12 00	36 00	24 00	30 00	444 00	11 00	26 00	6 00	19 00	894 00	726 00	683 50
Worcester North,	40 00	52 00	15 00	68 00	34 00	39 00	31 00	96 00	26 00	34 00	14 00	25 00	678 00	474 00	406 00
Worcester South,	42 00	47 00	32 00	2 00	39 00	58 00	6 00	55 00	28 00	11 00	7 00	66 00	428 50	393 00	387 00
Worcester South-East,	22 00	25 00	21 00	–	28 00	19 00	–	75 00	12 00	34 00	8 00	7 00	369 00	251 00	213 50
Hampshire, Franklin and Hampden,	47 00	23 00	22 00	12 00	66 00	26 00	85 00	558 00	70 00	23 00	10 00	151 00	1,058 00	1,093 00	853 00
Hampshire,	26 00	3 00	10 00	15 50	24 00	23 00	30 00	201 00	20 00	19 00	10 00	44 00	525 00	425 50	417 50
Highland,	32 00	13 00	14 00	3 25	23 00	14 00	27 00	99 00	22 00	9 00	6 00	32 50	432 25	294 75	294 75
Hampden,	49 00	24 00	31 00	15 00	20 00	16 00	71 00	399 00	30 00	8 00	16 50	10 00	961 00	689 50	605 50
Hampden East,	17 00	12 00	1 50	2 00	24 00	17 00	23 00	73 00	25 00	21 00	6 00	28 00	380 50	249 50	249 50
Franklin,	49 00	34 00	10 50	9 00	14 00	44 50	19 00	154 00	45 00	21 00	3 50	97 50	612 00	501 00	495 00
Berkshire,	46 00	34 00	45 00	12 00	45 00	29 00	14 00	348 00	129 00	33 00	37 50	53 00	941 00	845 50	845 50
Housatonic,	39 00	71 00	42 00	10 00	60 00	43 00	28 00	512 00	66 00	32 00	35 00	24 00	959 00	962 00	962 00
Hoosac Valley,	25 00	9 00	15 00	3 00	21 00	18 00	5 00	149 00	60 00	15 00	29 00	51 00	539 00	400 00	391 00
Norfolk,	30 00	67 00	13 00	–	12 00	–	–	157 00	34 00	12 00	22 00	–	544 00	347 00	196 00
Bristol,	54 00	47 00	32 00	6 00	81 00	43 00	49 00	124 00	17 00	31 00	26 75	16 00	551 00	1,026 75	1,026 75
Bristol Central,	51 00	49 00	9 00	4 00	69 00	13 00	28 00	124 00	18 00	40 00	48 00	67 00	623 00	520 00	520 00
Plymouth,	29 60	71 00	39 00	36 00	45 00	19 00	45 00	579 33	27 00	49 00	29 75	–	1,159 00	969 68	793 08
Barnstable,	15 00	12 00	10 00	6 00	–	6 00	35 00	39 00	16 00	20 00	15 00	–	285 00	174 00	–
Nantucket,	20 00	43 00	7 00	3 50	10 00	–	–	45 00	14 00	12 00	19 00	–	509 00	173 50	173 50
Martha's Vineyard,	78 00	24 00	25 00	7 50	12 00	13 00	34 00	46 00	59 50	12 00	5 25	13 00	503 50	329 25	311 88
Totals,	$969 60	$1,065 00	$590 00	$263 75	$884 00	$523 50	$656 00	$5,377 33	$811 50	$613 00	$464 25	$809 00	$16,245 75	$13,560 93	$12,389 21

ANALYSIS OF PREMIUMS AND GRATUITIES AWARDED—Continued.

FOR FARM PRODUCTS.

SOCIETIES.	Indian Corn.	Wheat.	Rye.	Barley.	Oats.	Beans.	Grass Crops.	Grass Seeds.	Potatoes.	Carrots.	Beets.	Parsnips.	English Turnips.	Ruta-Bagas.	Onions.	Other Root Crops.
Massachusetts,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Essex,	–	–	–	–	–	–	–	–	–	–	–	–	$8 00	–	$8 00	–
Middlesex,	$3 00	$3 00	–	–	$1 00	–	–	–	–	–	–	–	–	–	–	$63 00*
Middlesex North,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Middlesex South,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	45 50
Worcester,	2 00	1 00	$1 00	$1 00	1 00	–	–	–	$4 00	–	$2 00	–	1 00	$1 00	1 00	27 00
Worcester West,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Worcester North,	–	–	–	–	–	–	–	–	18 75	$4 00	1 75	–	1 00	75	5 25	31 88
Worcester South,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Worcester South-East,	7 00	–	–	–	–	–	–	–	–	7 00	–	–	–	–	–	7 00
Hamps., Franklin & Hampden,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Hampshire,	2 00	6 75	1 75	–	–	–	–	–	–	–	–	–	–	–	–	–
Highland,	3 00	4 00	–	–	–	–	$3 00	–	–	3 00	2 00	–	2 00	5 00	–	–
Hampden,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Hampden East,	5 50	–	4 00	–	–	–	–	–	3 00	–	–	–	–	–	–	–
Franklin,	2 50	–	–	–	–	–	–	–	50	–	–	–	–	–	–	10 00
Berkshire,	36 00	21 00	36 00	15 00	36 00	$6 00	12 00	$10 00	28 00	6 00	6 00	–	3 00	6 00	–	–
Housatonic,	65 00	27 00	42 00	15 00	41 00	6 00	5 00	13 00	20 00	–	–	$27 00	–	–	–	18 00
Hoosac Valley,	27 00	11 00	10 00	10 00	15 00	3 00	–	6 00	14 00	3 00	3 00	–	6 00	–	3 00	–
Norfolk,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	45 00
Bristol,	30 00	–	–	6 00	6 00	–	5.00	–	–	–	–	–	–	4 00	10 00	46 00*
Bristol Central,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Plymouth,	–	5 00	–	4 00	7 00	–	–	–	7 00	–	–	–	7 00	–	–	–
Barnstable,	21 00	5 00	–	–	5 00	–	–	–	–	4 00	–	–	–	5 00	–	4 00
Nantucket,	20 00	–	–	–	–	–	–	–	–	–	3 00	–	–	–	–	–
Martha's Vineyard,	16 00	–	5 50	1 00	11 50	2 55	–	–	12 60	5 25	6 75	–	13 00	–	1 65	6 90
Totals,	$240 00	$83 75	$100 25	$52 00	$126 50	$17 55	$25 00	$29 00	$113 85	$32 25	$21 50	$27 00	$41 00	$21 75	$28 90	$314 20

* Collections of various roots and vegetables.

FARM PRODUCTS—CONCLUDED.

SOCIETIES.	Total amount offered for Grain & Root Crops.	Total am't awarded for Grain & Root Crops.	Total am't paid for Grain and Root Crops.	Broomcorn Brush.	Fruits.	Flowers.	Any other cultivated Crops.	Milk.	Butter.	Cheese.	Honey.	Wheat Bread.	Rye and Indian Bread.	Corn Bread.	Total am't paid out under the head of Farm Products.
Massachusetts,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Essex,	$130 00	$16 00	$16 00	-	$127 00	$27 50	$68 50*	-	$30 00	$30 00	-	-	$10 50†	-	$447 00
Middlesex,	73 00	70 00	70 00	-	104 00	16 00	-	-	20 00	-	-	$11 00	3 00	-	224 00
Middlesex North,	115 00	32 00	70 25	-	80 00	-	6 00	-	14 00	-	-	12 00	6 00	-	202 50
Middlesex South,	92 00	-	-	-	48 50	15 25	-	-	16 00	-	$13 50	-	32 00†	-	72 27
Worcester,	42 00	42 00	42 00	-	-	-	-	-	33 00	40 00	-	8 75	6 50	-	130 25
Worcester West,	-	-	-	$17 00	19 75	14 50	-	-	10 00	50 00	-	5 00	6 00	-	113 25
Worcester North,	181 75	89 38	89 38	-	71 00	21 25	3 50	-	13 50	4 50	3 00	5 50	5 50	-	208 00
Worcester South,	50 00	-	-	-	34 75	3 00	15 50	-	14 00	14 00	25	12 00	6 00	-	99 50
Worcester South-East,	89 00	21 00	14 00	-	66 00	2 75	4.00	-	18 00	6 00	-	4 00	2 50	-	95 00
Hampshire, Franklin & Hampd.,	86 00	18 50	12 25	-	48 25	18 00	-	-	10 75	2 00	4 00	3 00	1 50	$1 50	71 00
Hampshire,	-	-	-	-	28 50	23 25	5 00	-	12 00	7 00	-	3 50	4 00	3 00	-
Highland,	84 00	29 00	29 00	-	23 50	6 00	9 00	-	6 50	6 50	1 50	75	1 25	-	77 00
Hampden,	30 00	-	-	-	60 50	15 00	43 00*	-	11 00	8 00	50	-	50	-	-
Hampden East,	96 95	12 50	12 50	-	8 50	2 00	-	-	15 00	9 00	1 50	5 00	4 00	-	82 50
Franklin,	62 00	13 00	13 00	-	46 25	23 50	-	-	9 00	7 50	1 00	4 50	7 00	3 00	114 75
Berkshire,	224 00	221 00	221 00	-	71 00	13 50	63 00	-	36 00	44 00	9 00	6 50	6 50	6 50	475 00
Housatonic,	355 00	282 00	282 00	11 00	58 00	20 00	20 00	-	27 00	27 00	3 00	3 00	3 00	6 00	460 00
Hoosac Valley,	161 00	111 00	111 00	-	41 00	10 00	-	-	10 00	31 00	8 00	5 00	5.00	-	218 00
Norfolk,	395 00	45 00	19 00	-	130 00	17 00	-	-	31 00	8 00	-	9 00	5 00	-	65 00
Bristol,	275 00	107 00	107 00	-	171 50	17 50	-	-	25 00	21 00	8 50	1 95	1 70	11 54‡	365 60
Bristol Central,	151 00	-	-	-	57 00	7 25	-	-	15 00	13 00	9 00	3 50	1 00	-	134 25
Plymouth,	175 00	30 00	18 00	-	110 75	39 50	-	-	21 00	21 00	-	5 50	5 50	-	138 75
Barnstable,	111 00	44 00	44 00	-	48 00	12 73	-	-	8 00	7 00	-	6 00	7 00	6 00	138 73
Nantucket,	142 00	23 00	23 00	-	40 50	12 00	-	-	7 00	-	2 00	2 00	1 00	-	252 50
Martha's Vineyard,	129 00	92 70	92 70	-	39 00	5 25	24 25	-	25 75	7 50	2 50	6 25	4 50	4 00	212 70
Totals,	$3,249 70	$1,299 08	$1,286 08	$28 00	$1,533 25	$312 73	$261 75	-	$438 50	$361 00	$67 25	$123 70	$136 45	$41 54	$4,397 55

* Vegetables.

† Different kinds of bread.

‡ Sundries.

Analysis of Premiums and Gratuities Awarded—Concluded.

MISCELLANEOUS.

SOCIETIES.	Amount awarded for Agricultural Implements.	Amount offered for raising forest trees.	Amount awarded and paid out for the same.	Amount for experiments on manures.	Am't awarded for all other objects strictly agricultural not specified before.	Amount awarded for objects other than agricultural.	No. of persons who received premiums and gratuities.
Massachusetts,	–	–	–	–	–	–	–
Essex,	$27 00	$30 00	–	$40 00	–	$213 00	285
Middlesex,	19 00	–	–	–	–	48 25	175
Middlesex North,	10 00	–	–	–	–	39 75	–
Middlesex South,	12 00	80 00	–	–	–	78 80	176
Worcester,	54 00	22 00	–	–	–	13 75	175
Worcester West,	12 00	30 00	–	70 00	–	63 61	172
Worcester North,	46 00	50 00	–	–	–	150 59	281
Worcester South,	6 00	35 00	–	75 00	–	91 95	145
Worcester South-East,	3 00	30 00	–	–	–	3 00	219
Hampshire, Franklin and Hampden,	23 75	20 00	–	–	–	60 75	265
Hampshire,	5 00	15 00	–	40 00	–	36 25	174
Highland,	–	–	–	–	–	60 50	155
Hampden,	–	15 00	–	–	–	46 50	101
Hampden East,	2 00	25 00	–	73 00	–	78 65	98
Franklin,	5 50	10 00	–	9 00	–	47 75	200
Berkshire,	50 00	–	–	–	$58 00	270 00	409
Housatonic,	21 50	–	–	–	9 00	162 00	286
Hoosac Valley,	17 00	–	–	–	–	184 00	265
Norfolk,	16 00	15 00	–	–	–	80 00	130
Bristol,	6 50	105 00	–	60 00	25 00	161 50	424
Bristol Central,	–	–	–	–	–	128 25	252
Plymouth,	–	60 00	–	60 00	–	289 65	320
Barnstable,	3 00	–	–	12 00	–	86 63	274
Nantucket,	–	13 00	–	12 00	35 00	33 12	109
Martha's Vineyard,	–	21 00	–	20 00	–	93 10	155
Totals,	$339 25	$576 00	–	$471 00	$127 00	$2,521 35	4,945

NAMES of the Cities and Towns in which resided the persons when receiving the Premiums and Gratuities awarded by the County Societies, and the several amounts as disbursed.

ESSEX.

Amesbury,	$9 50	Marblehead,	$9 50
Andover,	27 50	Methuen,	30 50
Boston,	7 00	Middleton,	8 00
Boxford,	27 00	Newbury,	31 00
Bradford,	155 00	Newburyport,	1 00
Danvers,	67 50	North Andover,	88 00
Fitchburg,	3 00	Rowley,	21 00
Georgetown,	14 00	Salem,	71 00
Groveland,	10 50	South Danvers,	22 50
Haverhill,	284 75	Topsfield,	12 00
Ipswich,	10 00	Wenham,	50
Lawrence,	2 50	West Newbury,	86 50
Lynn,	50	Total,	$1,000 25

MIDDLESEX.

Acton,	$72 00	Lowell,	$25 00
Bedford,	14 00	Providence,	6 00
Belmont,	42 50	Somerville,	85 00
Boston,	11 00	Stow,	11 25
Brighton,	1 00	Sudbury,	15 00
Cambridge,	23 00	Waltham,	8 00
Chelmsford,	7 50	West Cambridge,	51 00
Concord,	237 00	Westford,	50
Framingham,	3 25	Weston,	15 00
Groton,	7 00	Wilmington,	27 00
Hudson,	12 00	Winchester,	2 00
Lexington,	131 00	Woburn,	29 00
Lincoln,	48 25		
Littleton,	19 00	Total,	$903 25

MIDDLESEX NORTH.

Acton,	$20 00	Pepperell,	$8 75
Billerica,	14 00	Tewksbury,	40 00
Chelmsford,	86 50	Tyngsborough,	58 00
Dracut,	66 75	Westford,	13 75
Dunstable,	113 25	Wilmington,	14 25
Groton,	5 00		
Lowell,	187 25	Total,	$627 50

MIDDLESEX SOUTH.

Framingham,	$379 72	Southborough,	$56 50
Holliston,	24 00	Sudbury,	20 12
Hopkinton,	29 00	Wayland,	48 25
Marlborough,	19 00	Out of the district,	3 00
Natick,	40 90		
Sherburne,	11 00	Total,	$631 49

WORCESTER.

Auburn,	$5 00	Oxford,	$15 00
Barre,	39 00	Paxton,	1 00
Bolton,	15 00	Princeton,	109 00
Boylston,	2 00	Shrewsbury,	8 50
Charlton,	24 00	Southborough,	6 00
Dudley,	1 75	Southbridge,	70 00
Grafton,	50 00	Spencer,	10 00
Holden,	16 00	Sturbridge,	4 00
Leicester,	43 00	Sutton,	52 00
Leominster,	8 00	Warren,	2 00
Milford,	25 00	Westborough,	56 00
Millbury,	104 00	West Boylston,	41 00
New Braintree,	9 00	Worcester,	646 75
Northborough,	14 00	Total,	$1,377 00

WORCESTER WEST.

Athol,	$2 50	North Brookfield,	$13 00
Barre,	308 61	Oakham,	14 67
Brookfield,	10 00	Palmer,	145 00
Charlton,	14 00	Petersham,	8 25
Dana,	25	Phillipston,	2 00
Fitchburg,	75 00	Princeton,	17 00
Framingham,	15 00	Shrewsbury,	2 50
Hardwick,	72 25	Sutton,	21 00
Hopkinton,	10 00	Templeton,	8 50
Hubbardston,	7 33	Worcester,	85 00
Millbury,	30 00		
New Braintree,	39 00	Total,	$900 86

WORCESTER NORTH.

Ashburnham,	$7 00	Princeton,	$138 50
Ashby,	24 15	Royalston,	14 00
Fitchburg,	440 19	Shirley,	4 00
Harvard,	8 00	Sterling,	18 00
Leominster,	79 05	Templeton,	13 00
Lunenburg,	52 25	Westminster,	27 00
Oakdale,	50		
Petersham,	75	Total,	$826 39

WORCESTER SOUTH.

Brimfield,	$66 80	Southbridge,	$70 25
Brookfield,	6 25	Spencer,	3 75
Charlton,	136 65	Sturbridge,	139 70
Dudley,	57 80	Sutton,	24 50
Grafton,	6 00	Warren,	47 75
Holland,	12 25	Webster,	16 25
Java, N. Y.,	50	West Brookfield,	50
Milbury,	26 00	Woodstock, Ct.,	5 00
Oxford,	4 00	Total,	$623 95

WORCESTER SOUTH-EAST.

Abington,	$1 50	Northbridge,	$5 00
Bellingham,	7 50	Southborough,	14 00
Blackstone,	3 00	Sutton,	14 00
Clinton,	3 00	Upton,	31 00
Grafton,	10 00	Uxbridge,	3 75
Hopkinton,	33 62	Westborough,	40 00
Holliston,	35 00	Woburn,	25
Medway,	24 75	Wrentham,	7 00
Mendon,	73 75		
Milford,	240 75	Total,	$547 87

HAMPSHIRE, FRANKLIN AND HAMPDEN.

Amherst,	$80 00	Middlefield,	$8 00
Belchertown,	2 00	Northampton,	421 50
Chicopee,	29 00	Palmer,	60 00
Conway,	5 00	South Hadley,	99 00
Cummington,	15 00	Southampton,	22 00
Deerfield,	21 00	Springfield,	125 00
Easthampton,	44 00	Sunderland,	21 00
Granby,	10 00	Westfield,	85 00
Greenfield,	10 00	Westhampton,	7 00
Hadley,	85 00	Whateley,	5 00
Hatfield,	59 00	Williamsburg,	41 00
Huntington,	3 00		
Leverett,	4 00	Total,	$1,268 50

HAMPSHIRE.

Amherst,	$272 75	Monson,	$20 00
Belchertown,	44 20	Northampton,	3 00
Enfield,	5 00	Pelham,	21 25
Granby,	1 50	Springfield,	55 00
Hadley,	91 88	Sunderland,	109 60
Leverett,	19 48	Total,	$643 66

HIGHLAND.

Becket,	$56 75	Lee,	$5 75
Blandford,	50	Middlefield,	140 75
Cato, N. Y.,	25	Newton,	50
Chester,	32 25	Northampton,	19 75
Cummington,	8 00	Peru,	32 00
Dalton,	3 00	Pittsfield,	4 00
Hartford, Ct.,	25	Southampton,	50
Hinsdale,	68 00	Washington,	3 00
Huntington,	6 00	Worthington,	35 75
Lanesborough,	15 25	Total,	$432 25

HAMPDEN.

Agawam,	$6 00	Springfield,	$397 00
Chicopee,	104 75	Westfield,	85 00
Holyoke,	22 50	West Springfield,	54 00
Longmeadow,	45 00	Wilbraham,	61 00
Ludlow,	11 75		
Southwick,	4 00	Total,	$791 00

HAMPDEN EAST.

Belchertown,	$22 00	Palmer,	$98 50
Brimfield,	43 75	Ware,	6 00
Holland,	9 75	Wilbraham,	8 50
Ludlow,	8 00		
Monson,	242 00	Total,	$438 50

FRANKLIN.

Bernardston,	$18 25	Greenfield,	$136 75
Coleraine,	25 25	Heath,	50
Conway,	13 00	Leverett,	8 00
Deerfield,	112 50	Leyden,	27 25
Erving,	6 00	Montague,	4 00
Gill,	2 50	Northfield,	22 75

FRANKLIN—Continued.

Orange,	$4 50	Whateley,	$8 00
Shelburne,	266 75		
Sunderland,	36 50	Total,	$692 50

BERKSHIRE.

Alford,	$5 00	North Adams,	$24 00
Becket,	7 00	Peru,	11 00
Cheshire,	95 50	Pittsfield,	443 75
Curtisville,	8 00	Richmond,	59 75
Dalton,	63 50	Savoy,	4 00
Egremont,	7 00	Sheffield,	17 00
Great Barrington,	25 00	South Adams,	120 00
Hancock,	14 00	Stockbridge,	105 25
Hinsdale,	55 00	Troy, N. Y.,	100 00
Lanesborough,	227 75	Washington,	4 00
Lee,	129 50	West Stockbridge,	4 00
Lenox,	228 50	Williamstown,	67 00
Monterey,	3 00	Windsor,	2 00
New Ashford,	1 50		
New Marlborough,	1 50	Total,	$1,833 50

HOUSATONIC.

Alford,	$67 50	Richmond,	$24 00
Becket,	15 00	Salisbury,	1 00
Egremont,	133 00	Sandisfield,	17 00
Great Barrington,	645 00	Sheffield,	297 50
Lee,	91 50	South Adams,	11 00
Lenox,	126 00	Stockbridge,	177 00
Monterey,	41 00	Tyringham,	7 50
New York State,	8 00	West Stockbridge,	23 00
New Marlborough,	9 00		
Pittsfield,	9 50	Total,	$1,703 50

HOOSAC VALLEY.

Cheshire,	$50 00	Pownal,	$23 00
Clarksburg,	24 00	Savoy,	1 00
Florida,	61 00	South Adams,	120 00
Lanesborough,	19 00	Stamford,	15 00
Lenox,	5 00	Williamstown,	253 00
North Adams,	252 00	Total,	$823 00

NORFOLK.

Boston,	$16 00	Needham,	$71 50
Brookline,	34 00	Quincy,	1 00
Canton,	33 00	Randolph,	1 00
Dedham,	144 50	Roxbury,	27 00
Dorchester,	101 00	Sharon,	50
Dover,	41 00	Stoughton,	33 00
Foxborough,	2 00	Walpole,	25 00
Franklin,	2 00	West Roxbury,	64 00
Medfield,	28 00	Weymouth,	8 00
Medway,	16 00	Wrentham,	14 00
Milton,	62 00	Total,	$724 50

BRISTOL.

Acushnet and Seekonk,*	$424 17	Norton,	$151 10
Attleborough,	3 00	Raynham,	123 50
Berkley,	47 50	Rehoboth,	84 50
Dighton,	27 00	Seekonk. (See Acushnet.)	–
Easton,	63 29	Somerset,	34 25
Fall River,	19 25	Swansea,	11 50
Mansfield,	17 50	Taunton,	540 54
New Bedford,	37 25	Total,	$1,584 35

BRISTOL CENTRAL.

Acushnet,	$41 50	Dartmouth,	$10 00
Berkley,	24 50	Dighton,	8 00

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* Gratuities.

BRISTOL CENTRAL—CONTINUED.

Fairhaven,	$3 00	Raynham,	$89 00
Fall River,	232 50	Rochester,	11 75
Freetown,	20 25	Somerset,	25 00
Lakeville,	80 00	Swanzey,	25 00
Mansfield,	10 00	Taunton,	75 00
Middleborough,	50	Tiverton,	1 00
New Bedford,	101 00	Westport,	1 00
Norton,	79 00		
Portsmouth,	10 00	Total,	$847 00

PLYMOUTH.

Abington,	$22 75	North Bridgewater,	$236 37
Bridgewater,	509 91	Pembroke,	6 00
Carver,	16 00	Plymouth,	14 00
East Bridgewater,	127 00	Plympton,	22 50
Halifax,	44 25	Randolph,	25
Hanson,	75	Rochester,	8 00
Kingston,	10 90	Taunton,	115 00
Lakeville,	14 00	Wareham,	75
Marshfield,	8 45	West Bridgewater,	92 12
Mattapoisett,	50	Weymouth,	105 00
Medford,	130 00		
Middleborough,	130 50	Total,	$1,615 03

BARNSTABLE.

Barnstable,	$329 36	Orleans,	$20 00
Brewster,	10 00	Sandwich,	30 50
Dennis,	25 50	Yarmouth,	25 00
Harwich,	10 00	Total,	$450 36

NANTUCKET.

Nantucket,	$370 48

MARTHA'S VINEYARD.

Chilmark,	$219 59	Tisbury,	$318 81
Edgartown,	41 00		
Gay Head,	8 00	Total,	$617 40

The attention of the officers of the County Societies is earnestly directed to the importance of a most careful preparation of the above returns. Many discrepancies appear in the returns of 1866, some very considerable. For instance: the Essex Society in its financial exhibit, returns as having paid out $690 75, while in its analysis of payments it appears to have paid $1,000.25; the Worcester appears to have paid $902.86, but has paid $900 86; the Worcester South-East, instead of $417.80, has paid $547.87; the Hampshire, Hampden and Franklin, instead of $942.00, has paid $1,268.50; the Franklin instead of $621.00, has paid $692.50; the Bristol instead of $1,684.35, has paid $1,584.35; the Bristol Central instead of $1,306.50, has paid $847.00; and the latter society has actually returned as its capital fund paid in free of all incumbrances, nothing.

Errors like these when noticed by the public can only tend to throw these returns into disrepute, while carefully prepared papers will make them valuable exhibits of the annual agricultural proceedings of the various societies in the Commonwealth.

INDEX

TO THE SECRETARY'S REPORT.

Page.
Adaptation of crops to soils, 269–273
Agassiz, Prof. Louis, address of, 71–80
Age of animals for breeding, 81, 115, 116, 118
Agricultural Colleges combined with others, 15, 24, 54, 56
Agricultural education, discussion on, 11, 24, 28, 35, 60
Agricultural education, essay on, 341–348
Agricultural schools, 15, 23, 25
Agriculture, East and West, 30, 31
Agriculture of Bristol County, report on, 304–307
Agriculture of Hampshire County, West, report on, 300–304
Agriculture of Middlesex County, North, report on, 287–294
Agriculture of Middlesex County, South, report on, 294–299
Agriculture of Worcester County, South, report on, 284–287
Animal kingdom, chronology of the, 77, 78
Animals, fecundation of, 122, 123, 125
Apples, varieties of, 197, 198, 203, 223

Beef and mutton, 107
Board of Agriculture, annual meeting at Boston, 251
Board of Agriculture, its connection with the Agricultural College, 11, 21. 28, 48, 53, 349
Board of Agriculture, its history and operations, 13, 17, 19, 20, 23
Board of Agriculture, meeting of, at Salem, 11
Bone, flour of, 169, 185, 236
Bones, difference in solidity of, 108, 113
Boys, education of, 42, 45, 47, 59
Breeding, principles of, 79, 81, 84, 86, 89, 115, 117
Bristol County, report on agriculture of, 304–307
Bull, E. W., lecture by, 126–148

Cabbages, culture of, 173, 180, 183
Calves and lambs, rearing of, 109, 110, 120, 121
Carrots, culture of, 157, 162, 164, 182, 186, 190
Cattle disease, cost of eradicating the, 6, 10
Cattle husbandry, discussion on, 82, 88, 94, 102, 126, 151
Chadbourne, Prof. P. A., lecture by, 61–70
Chemistry and agriculture, lecture on, 228–251
Cleaning seed, 182
Clement, Asa, reports by, 195, 206, 211, 273, 281, 287, 294
Color in animals affecting their characteristics, 102, 103, 105, 111, 114
Cows, breeding of, 89, 98, 114, 119, 122

Page.
Cranberry culture, essay on, ... 281–284
Corn and root cultures compared, ... 189, 190, 194

Dairy, report on the, ... 308–312
Darwinian theory, ... 74, 110
Delegates, assignments of to county exhibitions, ... 349
Dogs, experiments on, ... 84, 124

Education, agricultural, ... 11, 24, 28, 35, 45
Enthusiasm, importance of, ... 42, 45, 47, 49
Essays, committees on, ... 350
Exhibitions, objects of, ... 257
Exhibitions of county societies, times of holding, ... 312

Fairs, management of, ... 255, 264
Farm, why men leave the, ... 39, 41, 43, 45, 51
Farmers' clubs, ... 29
Fecundation of animals, ... 122, 123, 125
Feeding of animals, ... 94, 109, 113, 120, 122
Flour of bone, use of, ... 169, 185, 236
Forests, characteristics of different, ... 265, 267, 273
Fraternity of intellect, ... 57, 59
Fruit culture, discussion on, ... 195, 201, 227

Grape culture, ... 126, 129, 139, 150, 242
Grape, manures for the, ... 132, 143, 144
Grape statistics, ... 146, 147
Gypsum, action of, ... 245

Hampshire County, West, report on agriculture of, ... 300–304
Hardy grapes, ... 127
Heakel's theory of species, ... 75, 76
Horses, improvement of, ... 86, 91, 99, 119, 121, 151, 261
Hubbard, N. S., reports by, ... 284, 287, 308, 362

Indian corn, comparative value of, ... 189, 191, 193
Insects attacking fruit and other trees, ... 216, 224, 278

Johnson J., Jr., essays by, ... 294, 299, 313, 322

Kelp, use of 172, 173
King, George A. essay by, ... 281–284

Lime, effect of on animal structure, ... 113
Location of the college, ... 48, 54, 56, 57
Loring, Dr George B., address and report by, ... 11–28, 322–340

Males, when to be used, ... 80, 81, 118
Mangolds, culture of, ... 164, 180, 184, 186, 192
Manures, analyses of, ... 231, 232, 236
Manures, varieties of, ... 233, 235, 246, 247
Meat, quality of, ... 106, 107, 114

Page.

Middlesex County, North, report on agriculture of, ... 287–294
Middlesex County, South, report on agriculture of, ... 294–299
Moore, John B., essay by, ... 269–273

Nichols, Dr. James R., lecture by, ... 228–247

Onions, cultivation of, ... 169, 176
Origin of change in color, ... 110, 112

Pasture lands, essay on treatment of, ... 313–322
Pears, culture of, ... 206, 208, 211, 213, 217, 222
Peat, methods of testing quality of, ... 339
Peat, report on, ... 322, 331, 336, 340
Perkins, C. O., essay by, ... 341–348
Phosphates, use of, ... 176, 193
Plants, as indicators of the nature of soils, ... 265, 269
Plants, causes of varieties in, ... 61, 64
Pleuro-pneumonia, report of commissioners on, ... 6–10
Potatoes, culture of, ... 156, 157, 171, 191

Rabbits, experiments with, ... 83
Root and field crops, discussion on, ... 153, 160, 180, 190
Root crops, manures for, ... 165, 193
Ruta-bagas, ... 163, 179

Seed, reproduction from, ... 143, 181
Selection of animals, ... 84, 93, 95, 97
Sexes, relation between the, ... 79, 81, 83, 88, 115
Sheep, breeding of, ... 91, 92, 107
Shorthorns, breeding of, ... 89, 91, 103, 104, 106, 120
Soil, nature of the, ... 265, 267, 269, 277
Slade, Avery P., report by, ... 304–307
Species, definition and origin of, ... 72, 75, 78
Squirrels, change of color of, ... 110, 111
Stockbridge, Levi, essay by, ... 265–269
Stock, breeding of, ... 84, 87, 93, 95, 101
Swine, breeding of, ... 117, 121

Transplanting fruit and forest trees, ... 273, 281
Turnips, culture of, ... 158, 163, 169, 187, 193
Turtles, observations on, ... 85, 125
Twitch-grass, ... 175

Universities, standard of education in, ... 33, 35, 37, 44
Use of grade bulls, ... 101, 104, 118

Variation of plants, ... 61, 63, 65, 69
Vineyards, planting of, ... 128, 134, 139

Watkins, M. F., report by, ... 300–304
Worcester County, South, report on agriculture of, ... 284–287

ABSTRACT OF RETURNS

OF THE

AGRICULTURAL SOCIETIES

OF

MASSACHUSETTS,

1866.

EDITED BY
CHARLES L. FLINT,
SECRETARY OF THE STATE BOARD OF AGRICULTURE.

BOSTON:
WRIGHT & POTTER, STATE PRINTERS,
No. 4 Spring Lane.
1867.

PREFACE.

The Returns of some of the societies still continue to be meagre and unsatisfactory, containing little that is of general and permanent interest, while others are delayed beyond the time allowed by law, and hence are not available in making up this Abstract. To meet this difficulty, the State Board of Agriculture, at its last Annual Meeting, passed the following votes :—

Voted, That the several agricultural societies receiving the bounty of the State be required hereafter to offer, annually, *three premiums*, of not less than eight, six and four dollars, respectively, for the best Reports of Committees who recommend the awards of premiums.

Voted, That the Secretary of this Board be requested to notify all the societies receiving the bounty of the State, that hereafter, in addition to the financial returns now required by law to be made on or before the tenth day of December of each year, they will be required to return a full and complete Report of their doings, printed in pamphlet form, on or before the fifteenth day of January following.

And that the Secretary will not be authorized to certify to the legislature, or to the State Auditor, that a society has complied with the law, and is entitled to its bounty, unless it has conformed to this requirement.

The object of the first requirement is to raise the quality of the Reports, now often very meagre and discreditable to the societies, and to promote their usefulness by stimulating the chairmen of committees to greater care and effort in their preparation. Some of the societies have already adopted this admirable plan, with highly satisfactory results, so that it cannot be regarded as a hardship to comply with so reasonable a requisition.

The object of the second requirement is to secure the returns in season to make them available in the preparation of the State Report, some of the full returns, by the practice hitherto adopted by the societies, coming in too late to be of any service.

The law is such that the government has a perfect right to require these returns in full on or before the tenth day of December. It has been found, however, that it was impracticable to require a full conformity to the letter of the law in this respect; for the reason that a strict enforcement of it would of necessity result in returns far more meagre than they now are, owing to the difficulty of getting full and elaborate reports from committees at so early a day. Indeed, the chief object of these returns—that of obtaining and diffusing valuable information among the people in all parts of the State—would have been defeated by a rigid adherence to the requirement.

On the other hand, the Secretary of the Board is required by law to send to the legislature a full estimate of the appropriations required for bounties to the agricultural societies, on or before the 15th of January of each year; and to enable him to certify that societies have complied with the law, and with the regulations of the State Board, it is impossible to extend the time allowed for printing, &c., later than that date.

Renewed efforts should be made on the part of the societies to extend their usefulness to the public, and increased exertions to impart information of some value to the community, not merely of their own locality, but of the whole Commonwealth. This is the grand object which the State has in view in its continued efforts to develop its agricultural resources by the offer of liberal bounties. The publications of a society, properly prepared and generously distributed, are now, as they always have been, the best means of communication with the public; and money judiciously expended for printing is the best investment it can make.

More care is also required in the supervision of statements made by individuals. A very large number of statements have been omitted in the preparation of this Abstract for the want of greater definiteness. The term "load," for example, has no definite general meaning. In a particular locality, where it is used, it may be understood; but it conveys no clear idea to the mind of a reader in another locality. The secretaries of the various societies can exercise such a general supervision as to secure greater minuteness of statement, and thus add to the usefulness of their Reports.

C. L. FLINT.

BOSTON, Jan. 23, 1867.

OFFICERS OF THE AGRICULTURAL SOCIETIES,

1867.

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Secretary—CHARLES TALBOT, of Taunton.

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Secretary—ROBERT ADAMS, of Fall River.

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President—CHARLES G. DAVIS, of Plymouth.
Secretary—LAFAYETTE KEITH, of Bridgewater.

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Secretary—ALEXANDER MACY, Jr., of Nantucket.

MARTHA'S VINEYARD.

President—JOHN PIERCE, of Edgartown.
Secretary—DAVIS COTTLE, of Tisbury.

AGRICULTURAL EXHIBITIONS.

1867.

Essex, at *Haverhill*,	September 24 and 25.
Middlesex, at *Concord*,	October 3 and 4.
Middlesex North, at *Lowell*,	September 26 and 27.
Middlesex South, at *Framingham*,	September 17 and 18.
Worcester, at *Worcester*,	September 19 and 20.
Worcester West, at *Barre*,	September 26 and 27.
Worcester North, at *Fitchburg*,	September 24 and 25.
Worcester South, at *Sturbridge*,	October 3.
Worcester South-East, at *Milford*,	September 24 and 25.
Hampshire, Hampden and Franklin, at *Northampton*,	October 3 and 4.
Hampshire, at *Amherst*,	September 24 and 25.
Highland, at *Middlefield*,	September 12 and 13.
Hampden, at *Springfield*,	October 1 and 2.
Hampden East, at *Palmer*,	October 8 and 9.
Franklin, at *Greenfield*,	September 26 and 27.
Berkshire, at *Pittsfield*,	October 1, 2 and 3.
Housatonic, at *Great Barrington*,	September 25 and 26.
Hoosac Valley, at *North Adams*,	September 17 and 18.
Norfolk, at *Dedham*,	September 19 and 20.
Bristol, at *Taunton*,	October 1 and 2.
Bristol Central, at *Myrick's*,	September 19 and 20.
Plymouth, at *Bridgewater*,	September 26 and 27.
Barnstable, at *Barnstable*,	October 8 and 9.
Nantucket, at *Nantucket*,	September 25 and 26.
Martha's Vineyard, at *West Tisbury*,	October 15 and 16.

AGRICULTURE OF MASSACHUSETTS.

FARMS.

NORFOLK.

From the Report of the Supervisory Committee.

On the 29th day of June, a majority of the Committee—together with several invited guests—assembled at the farm of Francis P. Denny, Esq., in Brookline. This may be called a milk farm; and the crops under cultivation had reference, mainly, to the production of milk for the market. The stock consists of twenty-two milch cows, several young heifers and one fine bull. The mode of feeding, is principally, by soiling; and, for this purpose, brewers' grains are used, and also oats and pease, cut green. Corn, potatoes and carrots are grown, and garden vegetables for domestic consumption. The stock is chiefly of grade or native breed. The milk finds sale, at the farm, for twenty cents per gallon. It will be recollected that this fine herd of milch cows was exhibited by Mr. Denny at the last annual show, and attracted much attention. Good judgment is apparent, both in the selection and the management of this stock, and the result, as might be reasonably expected, is a profitable one.

After the most courteous and attentive treatment by Mr. Denny, the company were conducted to the farm of Mr. Willard A. Humphrey. This is, also, a milk farm. The stock consists of thirty cows. One of these,—now twenty years old, and still in milk—has been a very superior animal. From the time of dropping her first calf, she has not failed to present another every succeeding year; and she has yielded twenty quarts of milk per day, when in full feed. Here were, also, a pure blood Jersey bull, two years old, and a grade Durham and Jersey, of both which animals Mr. Humphrey possesses the pedigree. He does not raise his stock, but prefers to buy, as need requires or opportunity offers, and he certainly selects it with sound judgment. His mode of feeding—like that of Mr. Denny—is chiefly by soiling. The calves are usually sold when two days old.

Proceeding hence we visited, with great pleasure, the extensive nursery of Mr. George Craft, the gentleman to whom the society has been so often and greatly indebted for the fine displays of gladiolas and other beautiful flowers, which graced the hall at our annual show. No description we are able to give, would convey any adequate idea of the delight which a lover of flowers would find in visiting this place.

We next came to the farm of Mr. William J. Hyde. His farm is devoted, mainly, to the cultivation of vegetables for the market. Pease, asparagus, potatoes, squashes, cabbages, onions, and other early vegetables and plants were observed in the most promising condition. The potatoes growing here were the "Jackson whites" and the "Sebecs." They were planted in pieces in drills. One piece is dropped in each place, and the places are from fourteen to sixteen inches apart. Manure is put into the hills. For nearly all his crops, Mr. Hyde spreads manure, and, also, puts a portion in the hill. We observed, also, in this place, grass and rye, both of which were in uncommonly promising condition.

Our time being now exhausted, we left Brookline with a strong impression that the grounds we had seen were under the most judicious and thrifty cultivation; and that examples of husbandry might easily be found here, which would rarely be equalled within the limits of our society.

July 26th the Committee were again assembled—together with a large number of distinguished gentlemen from different places—at the celebrated farm of Aaron D. Weld, Esq., of West Roxbury. After an hour of pleasant social intercourse, and a most munificent entertainment, the whole company adjourned to the beautiful lawn in front of the house. Here, brief and pertinent speeches were made by the President of the Society,—Hon. Mr. Wilder—and several other gentlemen, distinguished in the various departments of agriculture, horticulture and pomology. Hence we proceeded to view the farm premises, every department of which bears ample evidence of the intelligence, skill and orderly system by which the well-known results of Mr. Weld's husbandry are produced. This is apparent in the minor as well as in the larger and more imposing objects of regard in the wagons, carts and various implements in use upon the farm, as in the barns, capable of containing a hundred tons of hay, and fitted with every convenience for the care and keeping of stock, and for the manufacture and preservation of manure. It is seen, also, in the fruit-room, most conveniently arranged and prepared for the packing and keeping of various fruits ; in the apartments for vinegar and for cider ; the former filled with some fifty hogsheads of vinegar, in all its different stages of maturity, and the latter containing casks of cider for draught, and boxes filled with bottled-cider for the market. Mr. Weld considers his vinegar fit for use and sale when it is four years old. It is made only of pure apple-juice, and finds ready sale in the market. The cider is manufactured from the best selected fruit, and that of russet apples in preference to all others. In the failure or inferiority of his crop at home, last year, Mr. Weld had a large part of his apples brought from a distance of over five hundred miles. From seventy-five to one hundred barrels of cider are usually made every year. Hardly less famous than the Weld farm cider, is the currant wine manufactured here. Several casks of this wine, now three years old, were in the cellar, ready to be bottled and sent to order.

We also saw orchards and gardens, in which were some two thousand apple trees in bearing condition, and capable of producing from twelve to fifteen hundred barrels, annually, of selected fruit. A large number of thrifty pear trees, also, in full bearing state, with currants, strawberries and vegetables between the rows, in which they stood. A field of rye had been cut and stacked, which, in our judgment, would yield a superior and very heavy crop.

The work on this farm is performed, mainly, with horses. Nine horses are kept for farm and carriage use ; and others, from abroad, are boarded here during the winter. Hay is also sold from the farm. About one hundred and twenty acres of the land are under high cultivation, and of the remaining thirty or more upon the farm, a large part is woodland. The whole presents to the eye one of the most beautiful examples of a true New England farm. It has been held and cultivated by several generations of the same family. And it now offers to any one, desiring to see and understand the most profitable management of a farm, convincing proof of what can be accomplished by intelligent, thorough and systematic husbandry.

Mr. Weld is exceedingly fortunate in having the services of Mr. Meserve, as overseer and director of the work upon this farm. In the ability, good judgment and fidelity of that gentleman, all confidence may be placed ; and many farmers, who are not able to avail themselves of the services of so competent and reliable an assistant, may derive much instruction and benefit from a personal observation of his method of conducting the various operations on the farm of his employer.

In conclusion, the Committee beg leave to suggest the utility of distributing, at the annual meeting of the society, a brief series of inquires,—embracing important points in agriculture,—to which full and definite replies may be returned to the chairman, from each town in the county, before the preparation of the next annual report. In this way much valuable information may be obtained and diffused for the benefit of the whole society.

Respectfully submitted, for the Committee,

CHARLES C. SEWALL.

NANTUCKET.

Statement of James Thompson.

The farm that I enter for premium contains about twenty-six acres ; a large portion is what is called peat meadow, which is generally the best of mowing land, bearing a crop of excellent grass, nearly three tons to the acre if fairly manured ; about two acres are very poor sandy knolls ; the balance is sandy and clay loam and hard clay bottom, and all of the best tillage land, if well manured and cultivated with crops of any sort that the farmer desires to raise.

When I bought the farm I found it somewhat neglected ; rushes had come in, and the cattle had poached it in some portions very much ; it had been pastured by sheep and cattle for two years previous, and not much manure put on. I lightly manured about two acres of the best grass meadow, from which, and the balance of grass land, about eight acres in all, we cut about sixteen tons of best English hay, although the season was very dry. Three and one-quarter acres were cultivated ; the balance was pastured, and on it and the mowed meadows six cows, one bull and four calves were pastured through the whole season. One and three-eighths acres of the best land was manured with twenty-five cart-loads of good barn manure, twenty bushels to the load, then ploughed under, then twenty loads of good well decomposed barnyard manure was spread on and cultivated in with the common cultivator, after which it was harrowed once and marked off and planted, from the last of April to the 10th of May, as follows: 6 rods pop corn; 43 rods sweet corn; 50 rods white flint corn, or what is called Nantucket corn; 40 rods mangold wurzel beets; 12 rods onions; 26 rods cabbages; 16 rods carrots; 11 rods potatoes; 6 rods melons; 4 rods oats; 6 rods chiccory, parsnips, &c. The onions did not come well, and what did were mostly destroyed by the maggot; and on the 14th of July Italian turnips were planted by hand; on the four rods where the oats had been raised, and on the portion where early sweet corn, and among the early York cabbage, flat turnips were planted; and also where corn missed or was taken by birds, yellow-eyed beans were put in. This piece of land had been seeded to grass the year before, and the year before that it had been badly tilled, so that quantities of weed-seeds and twitch-grass had got such hold as to cause very much more cost of labor to subdue them, to let the crop have a chance to get a good start; but with the help of a dry season and much hard hoeing at the right time, every pest was well kept under till the crops covered the land. I said that this land was of the best portion, and on the whole it was; but it embraces as many kinds of soil as any piece of the same extent that can well be found—from a light, sandy, porous, (with no base,) to a stiff clay, cropping out nearly to the surface; and in planting I had reference to the soil and seed, by planting cabbage on the moist and richest part, and the mangolds on the most clayey part, and onions on the white, silver, sandy portions, and carrots on that which was of a soft, mellow texture.

In the charges or cost of producing crops, the man and horses are left out. No credit or charge can come in, as the man's yearly wages are put in against the whole farm, and the improvements and crops will be enhanced in value to offset them; and the same of horses, when at work for regular farm purposes;

the same, also, in regard to pasturing cattle; but as I had to buy a portion of hay and all the grain, I have been obliged to make account of hay grown and consumed, and the amount of cost, by adding the portion of hay consumed that was put into barns in July, at $17 per ton, to that which I bought in the latter part of last winter and spring, with the cost or what I paid for it. Having no grain of any sort to begin with, I have bought all that has been consumed; thus all the crop raised this year is now on hand.

The cost of producing the following, on the one and three-eighths acres, will stand thus:—

45 loads of manure, at $1; ploughing, $8,	$53 00
Planting and hoeing through the season,	22 83
Seed, and harvesting the whole crop,	21 75
Total,	$97 58

It is about impossible to keep the time of the man and horse, who have all sorts of chores to do, with five cows to milk and calves to feed, and three horses and carriages to keep in order for family use as well as farm work, and thus the extra help is only charged.

The following is the result of the above outlay, viz.:—

2 bushels pop corn,	$3 00
Sweet corn sold green,	26 27
23 bushels Nantucket corn, at $1.25; stover, $12,	43 00
275 bushels mangolds, at 40 cts. per bushel,	110 00
85 bushels carrots, at 50 cts. per bushel,	42 50
28 bushels Italian turnips, 60c.; 10 do. flat, 20c.,	17 80
3 bushels parsnips, $3; 4 do. onions, $3,	6 00
26 bushels potatoes, $1; 800 cabbages and cauliflowers, 5c.,	66 00
Melons, $12.83; squashes, $2.25; beans and pease, $6.50,	21 58
1 bushel oats, 85c.; straw and tops of roots, $3.50,	4 35
Total,	$340 50

One and three-eighths acres of the poorest land was ploughed, after putting on thirty loads of green barn manure, fifteen bushels to the load, on the 22d of May. The cost was as follows:

30 loads manure, at 75 cts. per load,	$22 50
Cost of ploughing and planting and seed corn,	8 50
of hoeing and cultivating, (very clear of weeds,)	4 00
of harvesting and shelling corn,	10 00
Total,	$45 60

Cr.

By 50 bushels shelled corn, at $1.25,	$62 50
2 tons stover, $10; 1 load pumpkins, $3,	23 00
Total,	$85 50

One-half acre adjoining the latter place was planted to Italian turnips on the 14th of July. The land was ploughed with corn land, and at each cultivation of corn the turnip land was run over with cultivator or harrow three times. The piece, before planting, was marked across in strips of eight paces wide; on one Pacific guano was spread at the rate of about 200 pounds per acre, and on the rest the flour of bone was applied at the rate of 300 pounds to the acre, and so on through the whole, except one strip, on which nothing was put. On the day before the seed was put in, it was all harrowed with a grain harrow. In the growth of crop no perceptible advantage was gained by the bone flour, but the guano was a marked advantage in weight of crop, and I think would have been much more so if the season had not been so very dry. The account stands thus:—

Ploughing, $2.50; planting, $1.20,	$3 70
Guano, $2.40; flour of bone, $3,	5 40
Labor hired for hoeing, $4.50; harvesting, $12,	16 50
Total,	$25 60

Cr.

By 88 bushels turnips, at 60c.,	$52 80
12 bushels small, 40c.; tops for young stock, $2,	6 80
Total,	$59 60

All the crops are credited at market value, and some have been sold at prices above this, which will make up any loss that may occur hereafter. Below is a summary of the whole :—

35 loads manure, on two acres grass land, at $1,	$35 00
Whole cost of mowing and getting in hay,	78 50
Cost of crop on first-named 1⅜ acres,	97 58
Cost of crop on next, or 50 bushels corn,	45 00
Cost of crop of the piece of turnips,	25 60
Repairing fences, ditching, setting trees, &c.,	47 50
Cost of carriages and harness work,	45 00
Cost of blacksmith's work, $37 ; tools, $14,	51 00
110 bushels roots, at market value,	55 00
38,855 lbs. hay, bought and used from crops,	372 89
Grain of all sorts through the year,	510 00
One bull calf, bought at 8 days' old,	28 50
Man's labor through the year, in all departments,	413 00
Total,	$1,804 57

Cr.

15 tons hay, worth, when put into the barn, $17,	$272 00
2 tons rough hay for bedding, &c., $10,	20 00
Value of crop on first-named piece,	340 50
Value of corn, &c.,	85 50
Value of crop of turnips, &c.,	59 60
906 lbs. butter, averaging over, but estimated 50c.,	453 00
Amount of milk sold through the year,	116 96
542 lbs. pork, killed and mostly sold at 15c.,	81 13
Pigs sold, $229.20, and six now on hand, $42,	271 20
Chickens and eggs through the year,	45 00
Two calves, sold young, for market,	9 50
One bull calf, sold at 8 days' old,	25 00
Use of stallion and other animals,	220 00
Use of horse and man carting stone and lumber, that cannot come into farm accounts,	75 00
Two bull calves on hand, 9 months' old, one $40 and the other $50,	90 00
One heifer calf, on hand, 10 months' old,	125 00
250 loads manure on hand,	250 00
Total,	$2,539 39

Apparent net proceeds, ... $734 82

But the above income covers the farm operations, not showing the improvements, such as ditching, setting trees, diking, and many other expenses in money or labor by myself and man, producing fruits in the gardens at the house in town, carting for store and house all the milk used in family, with vegetables and fruits, of which no account is or can be rendered ; but they may all go to offset the labor of making butter, &c. But the farmer has very many advantages that the townspeople do not, such as the use of horses and carriages, vegetables of the earliest and freshest growth, with butter, eggs and poultry in plenty, all of which he must work for ; and if he thinks it belongs to him, let him look at the mariner or mechanic, who has toiled all the best part of his life to get an establishment that will maintain him in his old age ; while the farmer can enjoy his usual occupation to the last year of his healthy life.

Before closing this Report, I wish to point out to the farmers, and also urge them all to take a correct account of all stock, tools and farm on some day of the year—say first of January or April would be the *best*, on account of the less amount of crops on hand at that time ; but that is generally a very busy time with the farmer ; still the small amount of capital at that time would make the trouble so much less, say to living. The farm and stock is worth, April 1st, 1867, $2,500. You would charge every night what had been expended during the day ; if anything unusual, name it ; and if anything was sold, place it to the credit side of the page. If you wish, keep another memorandum book for family accounts, and thus know at the end of each year where to save. If you come short, or wish to make improvements, these accounts would teach you to be particular in every department ; for there are more fortunes made by carefully attending to small things, and keeping the ends all tied up, than there are by launching into large schemes and leaving all the ends loose. At the end of the year it will become a pleasure to sum up the accounts, and see how much and what the credits are over expenses ; and if you cannot make that side the largest, why the sooner you abandon it for some other business the better.

James Thompson.

FARM BUILDINGS.

ESSEX.

Report of the Committee.

The Hon. William Sutton, President of the Essex Agricultural Society, has generously offered four premiums, of twenty-five dollars each; one for the best arrangement of farm buildings, economy (supposed) to be taken into the account. It is of as much importance to have farm buildings well arranged and convenient, as it is to have improved farm implements, such as the mower, the horse-rake and others of like character.

The writer well remembers the time when some barns had no doors to the floor-way, a few rails answering the purpose, and the boarding was so loose, that if a hen should unfortunately be buried in the hay under the beam, she could in some instances escape through the openings between the boards, or, if the space was not sufficient, she could put out her head and cry for help. Such a case was fortunate for the hen, but unfortunate for the cows, as they would be cold, and in stormy weather, covered with snow, would give but little milk, and when the time arrived for their accustomed drink, would rather stay in the cold barn, thirsty, than to buffet the storm to the spring or brook.

Now almost every good farmer has a warm barn for his cattle, and water in his yard, or some other convenient place.

In a well adapted barn, much *time* is saved in feeding and watering the cattle; besides, the more comfortably they are kept the better they will thrive, and the cows will give much more milk.

Among other improvements of the present day are barn-cellars, which are of great importance, as it not only saves the solid manure from being dried by the wind, and washed by the rain, but the liquids, which are of nearly as much value as the solid parts, can be mostly saved by applying muck or some other material by which it can be absorbed and applied to the land.

Also a portion of the cellars may be used for roots, vegetables or other purposes, such as circumstances and location will permit and the wants of the owner require.

Another consideration in favor of barn-cellars is, it costs little or nothing to keep them in repair. The roof of a building is not only expensive but soon goes to decay; therefore it seems desirable and economical to have as much available space under the same roof as possible.

About thirty-five or forty years ago, the Hon. Moses Newell, of West Newbury, built a large barn, with a cellar under it, for which he received a premium or gratuity from the Essex Agricultural Society. It was then considered a model barn.

Since that time, most of the barns which have been built in the county are nearly on the same plan; floor lengthwise the barn, stalls for cattle and horses on one side, and hay on the other, with cellar under and such other arrangements as circumstances seem to require and the opinion of the owner to dictate.

There have been four applications for premium,—Horace C. Ware, of Salem, John Day, Jr., of Boxford, Eldred S. Parker and Thomas Balch, of Groveland.

The barns of Mr. Parker and Mr. Balch are in common form, with cellars under; cattle fed from the floor. The fixtures in and around the barns are very convenient, showing a good degree of thought and wisdom in the arrangement.

Mr. Day's barn, as will be seen from his statement, is entirely different, being two stories above the cellar, which in the opinion of the Committee, is a very judicious arrangement, as it is economical and convenient, affording a large amount of additional room under the same roof. In addition to having water in his yard, as most farmers have, he has water in his barn for his horses and cattle, having a trough on wheels that can be moved along before his cattle with little trouble, which, in cold, stormy weather, must be very convenient.

Another arrangement the Committee thought favorably of, is doors at the end of the cattle stalls, sufficiently large to admit a cart for the purpose of carrying muck or other material to drop through the scuttles to make manure. His barn is also well ventilated, which is an important consideration, particularly the cattle stalls. Further information may be had from Mr. Day's description. If that is not sufficient, view it personally and no one it may be presumed will regret his trouble.

One thing, however, should be named. Mr. Day's situation was favorably adapted for building such a barn, there being a hollow between two small knolls or elevations which every location does not afford; consequently every person who would desire it, has not the location to build such a barn conveniently.

Mr. Ware's buildings are nearly all new, he having unfortunately lost his former buildings by fire. The stable and other buildings near the house are very convenient and well adapted to the purpose for which they were designed.

The barn, as will appear from Mr. Ware's statement, is on an entirely different plan from those above described. The floorway is on one side of the barn lengthwise, with a wing for the cattle stalls. Other arrangements in and around the barn convenient.

Mr. Ware's barn is built on nearly the same plan as those in New York, recommended by a committee, where several premiums were offered, one of which was $150. They recommended a wing for cattle, horses and sheep, on either side. Such barns, in the opinion of your Committee, are more expensive than those in common form here, and it must also be more inconvenient feeding cattle, as the hay must be carried a great distance, either on wheels, as recommended by the editor of the "American Agriculturist," or some other way.

The reasons for building on that plan are supposed to be, to prevent the breath and moisture of the cattle from coming in contact with the hay.

One of your Committee, more than thirty years ago, built a barn 84 by 40 feet, with cellar under, with stalls on one side the floor for cattle, which have usually been occupied. The barn is tolerably tight and warm, and very little or no inconvenience has been received from moisture to the hay, or unpleasant odor from the cellar. Other barns in the vicinity, differently located, where large numbers of milch cows are kept, and nearly all the time in the barn in cold weather, have received inconvenience from moisture.

Therefore, the conclusion of your Committee is, that no definite plan can be recommended, which will apply to all circumstances and locations.

Every person wishing to build a barn should first determine how much room he wants, and for what purpose it is to be occupied; then should examine the best barns in the vicinity and adopt the plan best suited to his location.

Your Committee would recommend that $15 be paid to John Day, Jr., of Boxford, and $10 to Horace C. Ware, of Salem.

JOSEPH HOW,
E. G. KELLEY, *Committee.*

Statement of John Day, Jr.

Having presented to your notice, for inspection and premium, my farm buildings, I hereby submit the following description of them. My carriage-house and granary is situated on the south-east side of a hill, making it convenient to drive into the basement and the first story. The building is thirty-three feet square, with a flat roof, covered with mastic roofing. The basement is eight feet deep, and is used for sawing and storing wood. There is also a small store-room. The first floor is eight feet high, and is used to keep carriages and farm implements in. The upper story is also eight feet high and is used for a granary. On the west and north sides are bins for corn, three and one-half feet deep, set out four inches from the sides of the building. There are also three doors on each of these sides that can be opened to admit the sun and air to thoroughly dry the corn. The flat roof I find very convenient for spreading fruit to dry. The outside of the building is finished with planed and matched boards, painted. This building is connected with the house by a covered passage, three and one-half feet wide, fifty feet long.

The barn is situated north-west of the granary. It faces the south. It is one hundred feet nine inches long, forty feet wide, twenty-six feet posts. The cellar is nine feet deep, the bottom paved with small stones. Eighty-eight feet of the cellar is used for manure, and to keep swine. In the east end is a room twelve feet wide, with cement floor, which I use to store vegetables in. On the first floor I have tie-ups to accommodate forty-one head of cattle, which occupies seventy-two feet of the length of the barn. The tie-ups are thirteen feet four inches wide, and the floor between them is the same width. The height of the tie-ups is seven feet, and the floor is eight feet high. Twenty-four feet of the south side is used for horse stalls and harness-room. On the north side, is a meal-room and a spare stall. Between the meal-room and stall is the passage to carry the swill to the cellar for the swine. On the east and west ends are wide doors, that will admit a cart and oxen, for the purpose of carrying in muck, &c., to put into the cellar below. This story is ventilated by four conductors,—two opposite each other,—sixteen inches square, running up back of the bays, then following the roof uniting in a common ventilator on the top of the building. In the second story there is a bay on either side, one hundred feet long, thirteen and one-half feet wide. The posts on the back side are nineteen feet high. In the middle is a floorway, thirteen feet wide, with a scuttle in each band to drop the hay to the story below. There are also places to conduct the hay to the horses' cribs. In the second band from the west end I have put in Fairbanks' hay scales, which are very convenient to weigh stock, hay, &c. The third band from each end is dropped down three feet from the beams, to make it easier to fill from the floor. The bays are ventilated on the back of the hay by swivel blinds, placed at the bottom of the bay, which can be opened or closed at will. There are also slats running from the bottom up to the top, inside the timbers, to give a free passage of air behind the hay. The entrance to this story from the ground is over a bridge at either end, twenty-two feet long, fourteen feet wide. Over the middle floor, on the posts, is laid a tight floor, thirteen feet wide. On either side of this floor is an open floor, thirteen and one-half feet wide, for storing corn fodder. It is laid with plank eight inches wide, eight inches apart, laid loose, so they can be slipped back when the bays are filled with hay. There are stairs leading from the first story to the cupola on the top of the building. The outside of the barn is boarded, clapboarded and painted and the roof shingled. It is lighted by eight windows on each side, and two in either end. There are lights over the large doors in the second story.

In the basement there are eight lights on the north side. On the south side are large doors, which are kept open in summer and closed in winter. The barn is supplied with pure spring water (from the hill, 1,500 feet west of the barn,) by an aqueduct. It is carried into the first story and the two yards. The yard on the south side is 90 feet square. On the west side is another yard, 100 feet long, 40 feet wide. Twenty-five feet of this yard is covered, forming a shed on the north-west corner of the barn. In the south-west corner of the large yard is a building thirty-three feet square. The lower story is used for a hennery, the next story to store farm implements, and the upper part of the building I use to store and manufacture cider vinegar.

Boxford, October, 1866.

Statement of Horace C. Ware.

I here give you a statement and plan of my barn and out-buildings as near as I can. The lumber I contracted for in the State of Maine last winter, and let out the most of the labor by contract; and in reckoning up, I find my large barn, 80 by 40 feet, with lean-to for cattle attached, 32 by 60 feet, to cost about $3,250, including the cellar, without any account of my own labor. I have ventilators on both barn and lean-to, with slated roof; cellar under the entire building about ten feet deep, giving ample room to drive in and tip up a cart. Under the lean-to is ample room for the making of manure. Under the main barn is room for a vegetable cellar and for carts and wagons; also open to the cowyard, which faces the south, where there is a never failing supply of water running.

Nearly opposite the barn is a building which I built ten years ago, at a cost of $325, when building material was much lower than now. This building is 35 by 22 feet, built on a side hill, the upper, as well as the lower part, being level with the ground, and is used for the storage of ploughs, sleighs, mowing-machines, barrels, harrows, gates in winter, and sometimes for wagons. Under it is room for carts and wagons.

My other out-buildings near the house consist of a stable for horses, 25 by 20 feet, with cellar under it for hogs and manure. Attached to the stable is a one-story building, about 100 feet long, and used for three open sheds, wood-house, carriage-house, work-shop, tool-room for farm implements, privy and wash-room, where I have a boiler and sink set, with water running when desired. Under the wash-room is a cellar for the storage of wash-tubs, and also for cooling off the milk before it goes to market, as there is running water in this cellar. The carriage-house, work-shop and tool-room, set on posts at back part, facing the south, which makes a fine warm hennery to keep my hens in at seasons when I don't want them at large. The cost of this string of buildings is about $1,000.

My house is not yet completed, and is larger than is necessary for a farm-house; yet that part which is required for farm use is very convenient, and not expensive for the times, the lower floor having kitchen, dining-room and men's sleeping room, with ample closets in each room, and water in kitchen.

SALEM, October, 1866.

IMPROVEMENT OF PASTURES.

PLYMOUTH.

From the Report of the Supervisor.

Charles A. Keith, of West Bridgewater, having commenced and carried through, to a reasonably satisfactory result, an experiment under this offer, is entitled to the first premium, of $12. Mr. Keith says in his statement:

"The pasture land entered for your premium is in two lots. Lot No. 1 is in North Bridgewater, and contains ten acres. It had not been ploughed for about sixty years, and was covered with sweet fern, moss and huckleberry bushes. In August, 1861, we broke up about one-third of it and sowed to rye, spreading over it three hundred and thirty pounds of Peruvian guano. We harvested from it thirty bushels of good grain. In 1862 we ploughed another third of the lot and sowed it to rye, without any fertilizer. The crop was hardly worth harvesting. The following year we turned in the stubble and sowed again to rye, putting on one hundred and fifty bushels of leached ashes. The crop this year was thirty-six bushels. The last part of the lot we ploughed in 1864 and sowed to rye, putting on one hundred and eighty bushels, leached ashes. The yield of grain was twenty-nine bushels. In March of each year we sowed clover and fine-top seed. It now, I should judge, produces three times as much feed as it did before it was broken up.

"The second lot is in West Bridgewater, and contains three and one-half acres. In the spring of 1863 we ploughed about one-third of the lot and planted potatoes, manuring two-thirds with green manure and one-third with superphosphate. We had a fair crop, the best yield being from the green manure. The other two-thirds of the lot were ploughed in 1864, and planted also to potatoes, manuring with hassock ashes, getting a crop of about seventy-five bushels per acre. We planted Lot No. 2 two years, more effectually to subdue it. This year we sowed to oats and grass seed. The oats we have not yet threshed. It is light land, but we consider it very much improved."

The improvement in Mr. Keith's pasture is apparent. His statement that it produces three times as much as it did formerly is fully warranted, and that the improvement in its quality is quite equal to its increase in quantity, his neat stock would doubtless affirm, could they give oral expression to their great satisfaction with the efficiency of their *commissariat*.

We are not quite sure that the raising of rye is fully within the scope of a premium experiment in renovating pasture lands, or that it is, on the whole, a profitable or economical accompaniment to such an experiment. The immediate return, in this case, was some ten bushels of rye per acre, from the value of which must be deducted the cost of seed, and of harvesting and threshing, as well as a loss to the soil of a part of its inherent elements of fertility and of a considerable portion of the manure applied. Mr. Keith's experiment might have been made more instructive by varying the course of proceeding on different portions of his lot. For instance, by sowing one-third with rye, and with grass seed the following spring; another portion with both rye and grass seed, at the proper time for sowing rye; and the residue with grass seed only, in July or August.

The practice of sowing grass seed upon the surface of grain fields in the spring, although common in some localities, seems to be of doubtful expediency. After the soil has become compacted by the storms of winter, and by its own adhesiveness, there must inevitably be a considerable loss of seed through failure of germination, and a consequent irregular distribution of plants, which, under the disadvantage of an unequal struggle with a vigorous opponent, already in full possession, can make but feeble growth. Many experienced farmers deem it the better course to turn in the stubble, after harvesting their grain crops, and seed down upon the fresh, mellow earth. It is believed that the increased value of the subsequent grass crops will more than compensate for the additional expense.

Too little attention is paid by farmers to the renovation and maintenance of their pasture lands. In Plymouth County, where there are considerable tracts of land of indifferent quality, not readily available for any agricultural purposes except pasturage, where labor is scarce and manure cannot easily be procured, as it may be in the vicinity of cities and large towns, the practice of soiling will not obtain to any great extent. During some six months' in every twelve cattle must be their own purveyors, and fortunate is he whose own and whose neighbors' fences are sufficient to prevent a succession of predatory raids across his borders. The farmer who neglects his pastures must incur additional expense in fencing them, and increased cost in wintering his cattle, ill-fed during the summer.

It is quite too common to hear farmers say they can winter more stock than they can summer, while, at the same time, their pastures are the favorite resorts of whortleberry gatherers, or the chosen haunts of burrowing animals, which find ample security amid tangled masses of ferns, briers and laurels. Nature delights in wildness, and however thoroughly subdued, for the time, by her cunning opponent, Art, she is ever alert to regain her lost supremacy, planting a brier, a bush or a tree, wherever the slightest indication of supineness on the part of her skilful antagonist will warrant the effort. By constant vigilance only can the inroads of these unwelcome visitors be prevented. A persistent use of the scythe will so reduce their vitality as to render their presence comparatively harmless. August is generally recognized as the best month for this operation. Many careful observers are of the opinion that bushes can be more effectually subdued by being cut on the decrease of the moon than at any other time. Reasons why such should be the result are not apparent. But if it is a recognized fact that vegetation is differently affected by different relative positions of the earth and moon, the philosophy underlying the fact is not of paramount importance to practical men. And it is not always wise to disregard or reject popular conclusions, merely because they are not fortified by any plausible theory. One thing may be safely affirmed, viz.: bushes which are invariably cut close to the ground, on the decrease of the moon in August, will never become fully masters of the situation.

But the process of mowing bushes is merely conservative, having, like all conservatism, no higher aim than that of keeping "things as they are." For permanent improvement more radical measures are necessary, and the plough, where it can be used, is the most approved agency for initiating them. One of the principal reasons for the neglected condition of pasture lands is to be found in the reduced number of oxen kept by farmers, and the constant demand for their labor away from the farm. In the olden time, when every farmer kept oxen, and kept them at home, except as he "changed work" with his neighbors; when, next to skill in wrestling, men prided themselves upon their skill in "holding a new ground plough;" when cattle shows were not invented, and the farmer's principal holidays were when they gathered, with their teams, to break up the rough pasture of some neighbor whose turn had come to furnish the liquor,—which could be bought anywhere for notes secured by mortgage,—bushes were kept in much better subjection than they are in modern times, when rum is too poor to be drunk and too costly to be wasted; and when the four, five or six dollars, which a man with his team may readily earn in a day abroad, causes him to look upon time and labor spent upon his farm as almost thrown away. Now, if we must choose between the liquor and the bushes, let us have the bushes by all means. But either is a nuisance which no good farmer will tolerate on his premises, except under coercion.

But little feed is expected from old pastures after midsummer. If they are then ploughed, the furrows thoroughly pulverized with the harrow and the ground laid to grass, with suitable fertilizers, or even without, if nothing better can be done, they will be ready for feeding the next season, the herbage largely increased in quantity and improved in quality, with no loss of a crop and without the cost and labor of fencing usually incident to the raising of cultivated crops on pasture land. These suggestions have reference only to such land as is used solely for pasturage. Where land is of suitable quality, and so subdivided by fences that it may be used alternately as tillage land and pasture, a different course may be advisable.

But whether land is tilled after being ploughed, or laid down upon the newly turned furrow, thorough seeding and generous manuring are essential to a perfectly satisfactory result. The "barn chaff" with which farmers sometimes seed their pastures may be preferable to an entire absence of seed; but pastures as well as meadows will well repay the cost of the best seed which can be obtained. He who sows chaff should not complain, if, in return, he gets nothing but foul grasses and weeds.

Much of the land used for pasturage is rendered almost worthless by a superabundance of water. If the surface of such land is at all inclined and suitable for the plough, it may be cheaply and tolerably well drained by being ploughed in narrow lands, parallel with the plane of inclination, deepening the middle furrows with the spade if necessary. This process involves a loss of productive area, equal to the space occupied by the ditches; but the increased value of the products on the residue will more than compensate for such loss.

At the farmer's meeting, on the last day of the annual exhibition of the society, an interesting discussion took place, mainly on the question: "What the Plymouth County farmer should raise." It can hardly be supposed that the subject was exhausted in the hour devoted to its consideration. It may be doubted whether any reliable conclusion was reached by any one whose opinions were not already fixed. The question is susceptible of, and demands a division. The answer to the question, What should the Plymouth County farmer raise as food for his stock? may depend upon considerations different from the answer to the question, What should he raise for market? Probably no answer, applicable to all farms, can be given to either. Notwithstanding their facilities for ascertaining the results of other men's experience, farmers may still be supposed competent to learn something from their own. When, therefore, we hear one experienced farmer, who is capable of observing facts and deducing conclusions, commend turnips as superior to all other roots for neat stock, and another, equally capable and equally experienced, characterize them as nearly worthless, are we to infer that one is wholly right and the other wholly and necessarily wrong? May it not be true, rather, that each is right, as to his own experience, and only wrong in attempting to deduce from that experience a rule of universal application? Is it not quite probable that cattle on one farm require different feed from those on another. As an illustration, cattle on some farms will leave the most tempting food that can be placed before them to chew and swallow an old honey-combed bone, from which the fatty matter and cartilage have been removed by decomposition. We know men who are careful to secure for their milch cows every such bone lying in their path; and if furnished in sufficient quantities to cattle which desire them, there need be little fear of the horn-ail or other kindred diseases, consequent on a deficiency of bone-producing elements in the usual food. Hence, bone-meal has been recommended for all neat stock. This recommendation furnishes an example of the folly of drawing universal conclusions from partial facts, and it should not be adopted for two reasons. The first is, that bone meal, as usually purchased, contains more or less undecomposed animal matter, which is distasteful and in some cases poisonous; and the second,—which is pertinent to the subject under consideration,—is, that on many farms, where the herbage abounds in phosphate of lime, cattle need no additional supply, and are never known to seek it by eating bones.

It is possible, then, that a difference in the constituents of the soil of farms, and a consequent difference in the qualities of the grasses they produce, may lie at the foundation of the opposite results noticed by individuals on feeding any particular crop to their stock. Ruta-bagas probably contain more of the phosphates than any other root crop, and, if so, they must be much more valuable where the usual herbage is deficient in these elements than where there is no such deficiency. Till agriculture becomes more of a science than it now is, farmers must rely mainly upon their own experience in determining what crops they should raise for the stock upon their own farms.

On the question of raising crops for market, it is truly fortunate that unanimity of opinion is impossible. Our farmers depend mainly upon local markets. If all were to devote their energies to the raising of one and the same crop, they might find themselves in the condition of some of our Bristol County friends, who are said to have ploughed in their unsalable onions for manure. It is not wise to infer, because turnips have sometimes sold for two and three dollars per barrel, that they will always prove remunerative; nor that corn can always be bought for a dollar a bushel, because such has been the case during the past year. It requires no great effort of the memory to recall the time when it sold for considerably more than twice that sum, and when it was a very remunerative crop, even if it did cost more than a dollar a bushel to raise it.

In order to decide wisely what he should raise for market, the farmer must consider the nature of the soil he is to plant, the amount and kind of labor he can command, and the probable requirements of the market he proposes to supply. Having given due thought to these considerations, and to others which may suggest themselves as applicable to his peculiar circumstances, each will arrive at a conclusion satisfactory to himself; and hereafter, as heretofore, one will raise turnips, another potatoes; one will supply the market with milk, another with hay, another with fruit; and so on through the whole list of farm products, and each will learn that in agricultural, as in other operations,

> "All nature's difference keeps all nature's peace."

ALDEN S. BRADFORD, *Supervisor.*

RECLAIMING SWAMP LANDS.

MIDDLESEX SOUTH.

Statement of Isaac V. Adams.

I enter for premium a tract of improved meadow land twenty-five rods in length by six and one-half rods in width, situated in Little Cedar Swamp in the town of Hopkinton. This swamp underwent certain improvements in 1862, of which some account may be found in the published Transactions of 1865, during which two wide ditches were excavated through the main part of it for the convenience of those who might wish to drain their land, preparatory to making other improvements.

The acre which I enter for premium lies adjacent to one of these wide ditches, and extends easterly six and one-half rods towards the shore. In order to secure perfect drainage, I found it necessary to excavate a ditch along the easterly side of this acre, which I connected with the main ditch by a shorter ditch across the south end, making thirty-one and one-half rods of ditch, three feet wide at the top and two at the bottom, and three feet deep, which cost by contract thirty-three and one-third cents per rod. And here I wish to speak of the condition of this tract previous to 1862. The surface was extremely uneven, being obstructed by immense bogs, or, as they have always been termed in this locality, *hassocks*, a name given to a hump of earth rising abruptly to the height of one or two feet, and in some instances three feet, and covered with a coarse, wide grass, which sends its strong roots deep into the peat, and often sticking into the clay subsoil, making it impossible to extricate them with the strongest team, without first cutting beneath them with the bog-knife. The low part was adjacent to a brook, and nearly on a level with it, so as to be overflowed by it after even a summer shower. The grass which grew upon it had to be spread upon the hassocks, or carried upon poles to the shore, in order to dry it, and was of so inferior a quality as to barely pay the expense of securing it.

When, seated upon the mowing-machine and horse-rake the present year, I glided easily over the smooth surface which now presents itself to your eyes, rejoicing in the realization of two tons of good timothy to the acre, it was almost impossible to believe that I had possessed patience to stand ankle deep, if not knee deep, in the water year after year, and swing a heavy scythe over those hateful hassocks, to secure half a ton of coarse hay only fit for bedding for my cows. Having first attended to the matter of drainage in the manner indicated in a preceding paragraph, on the 1st day of July, 1864, I commenced burning. As there was a light crop of grass standing, the fire passed rapidly over the surface, but did not work as effectually in the sod as was desirable. Many of the hassocks continued to burn for several days without showing any signs of weakness. The sod was next subjected to a severe harrowing, occupying man and team one-half day. It was then permitted to dry until August, when another fire was set, which completed the destruction of the grass roots, and left only a few hassocks, which were all cut away with the bog-knife, and after remaining awhile in piles to dry, were again set on fire and mostly consumed.

A half day was next spent in spreading back from the side of the ditch a quantity of gravel, covering the surface of the meadow to the depth of three inches.

On the 7th of September, 1864, I sowed seven quarts of timothy grass seed, and harrowed and bushed it. In the following spring I sowed another quart of seed in spots where the seed sown the previous fall had not taken root. June 10th, 1865, mowed one and one-half tons of good hay with a Kniffin mower —raked the same with a horse-rake. September 6th, 1865, mowed again with Kniffin mower, and obtained one-half ton of rowen. I formed a compost heap in a sand-bank near the meadow, mixing vault manure with the sand in the proportion of one part of manure to four of sand.

In October I spread two and one-half cords of this compost. In December I spread fifty loads, of eighteen bushels each, of sand upon that portion which had received none of the gravel from the ditch, at an expense of twenty cents per load.

July 7th, 1866, mowed with machine a good crop of grass, free from weeds and wild grass. The grass was taller than last year. July 8th, raked with Whitcomb's horse-rake and carted into the barn two tons of hay.

EXPENSES.

1862.	1 acre land, ...	$10 00
1863.	Tax for ditching, ...	5 00
1864.	31½ rods ditch, at 33⅓ cents, . . .	10 50
	Burning twice, (one-half day each,) . .	1 50
	Harrowing one-half day with team, . .	1 50
	One-half day spreading gravel, . . .	75
	1½ days cutting hassocks and burning, . .	2 25
	1 day sowing grass seed, harrowing, &c., .	1 50
	1 peck seed, ...	1 00
1865.	Cutting two crops hay, ...	7 00
	2½ cords compost, at $4, ...	10 00
	50 loads sand, at 20 cents, ...	10 00
1866.	Cutting hay, ...	3 50
		$64 50

Credit.

1865. 2 tons hay,	$40 00
1866. 2½ tons hay,	50 00
Present value of land,	100 00
	$190 00
	64 50
Net profit,	$125 00

Statement of George A. Adams.

Before entering upon a detailed account of my operations upon one acre of meadow land entered for premium, I beg the indulgence of the committee for a few moments, while I give a brief account of the tract of land of which it is a part. Little Cedar Swamp is a name applied to a plot of two hundred acres of very low land situated in the easterly part of the town of Hopkinton. It is a part of an extensive tract of land donated to Harvard University in the early history of the country by one Edward Hopkins, Esq., of England.

A century ago this swamp was covered with an immense forest, so dense that a yoke of oxen could not possibly be driven through it. It was then a famous resort with sportsmen, for its thickets afforded an abundance of fowl, and Cold Spring Brook, which meanders through it, was replete with fish. A succeeding generation demolished the forest, and for a few years secured a fair crop of fair meadow hay. But both the quantity and quality of the hay deteriorated rapidly, and the proprietors united in building a dam, at considerable expense, for the purpose of flowing the land during the winter, considering it an advantage to protect the grass roots from severe freezing, and hoping also that cranberries, which had already made their appearance, might be encouraged thereby. The dam also secured an extensive reservoir for the benefit of a mill which was controlled by the meadow owners.

But the effect upon the hay crop was not as favorable as anticipated and in a few years the grass was considered scarcely worth the cutting. Cranberries were now paying great profits in some portions of the State, and certain speculators bought up plots of this meadow and attended their culture, but soon became discouraged, and were glad to sell their land for less than its cost. Little Cedar Swamp was now considered worthless property, or so nearly so that some plots of it were sold in 1860, for five dollars per acre. It was so soft that cattle could not be driven over it, and the small quantity of hay which it afforded was removed to the upland by means of poles. The quality of the grass was so inferior and the expense of securing it so great, that much of it remained uncut from year to year. The tract was also valueless for wood, as it had become so wet and stagnant that maples, the only wood upon it had made no visible increase in size for many years.

In 1861, operations were commenced which were destined to make Little Cedar Swamp the most valuable tract of land in town, and double the stock-keeping capacity of some of the adjoining farms. Three commissioners were appointed by the superior court of Massachusetts, to survey the tract and make any necessary improvements. This commission opened five hundred rods of ditch and improved the means of drainage so as to make it possible for the owners of individual plots to convey the surplus water from their land and make other improvements at discretion. The expenses incurred by the commission amounted to five hundred dollars, which sum was assessed upon the proprietors, and collected according to the laws for improving meadow and swamp land.

The acre entered for premium lies at a considerable distance from the upland. The muck varies from three to five feet in depth. In the summer of 1864 this piece was burned over in connection with land adjoining at an expense of one dollar. A ditch three feet wide was opened on each side, connecting with the principal drain, costing by contract, thirty-three and one-third cents per rod. This ditch being equally advantageous to the adjoining land, only one-half its cost is charged to this experiment. Subsequent operations are in the form of a diary.

June 3d, 1865, harrowed both ways, occupying man and team one-half day.

June 6th and 7th, burned again, requiring the attendance of a man one day.

June 10th, harrowed again both ways.

June 13th, sowed three and one-half bushels oats and seven quarts timothy, harrowed and bushed.

August 8th, cut the oats for fodder. Four loads of 1,200 pounds each.

August 12th, harrowed the stubble.

August 20th, burned the stubble on the ground.

September 1st, sowed six quarts timothy and one peck redtop, occupying man and team one day.

May 10, 1866, sowed grass seed in spots where seed sown in fall did not come up.

July 30, 1866, cut the grass.

August 1, 1866, raked and carted two tons of excellent hay, the ground being hard enough to bear the weight of the oxen, and loaded cart without difficulty.

There has been no sand, loam or compost whatever applied to this piece, the only means of enriching it being the ashes left by burning the grass roots and oat stubble.

The expenses of the experiment are given below, and perhaps it may be said in conclusion, that this acre is quite as valuable as a four acre plot adjoining, for which the owner proposed the snug price of two hundred dollars per acre.

EXPENSES.

One acre land costing in 1860,	$5 00
Tax of the commission 1863,	5 00
Burning in 1864,	1 00
One-half cost of 40 rods ditch,	6 67
Harrowing three times, 1865,	4 50
Burning twice, 1865,	3 00
3½ bushels oats (seed,)	3 00
7 quarts grass seed, 1865,	1 30
Sowing,	1 00
4 days' labor cutting and carting oats,	6 00
6 quarts timothy and 1 peck redtop, sown in fall,	1 00
Seed and sowing seed, spring of 1866,	50
3 days' labor getting hay, 1866,	6 00
Total expense including care of crops,	$43 97

PROFITS.

1865, two and two-fifths tons of oats,	$43 20
1866, two tons English hay,	50 00
One acre of good land,	100 00
	$193 20

ORCHARDS.

MIDDLESEX.

From the Report of the Committee.

The Committee on Orchards received invitations to examine the pear orchards of Mr. John R. Poor, of Somerville, Mr. Hervey Davis, of Cambridgeport, Mr. Edwin Wheeler, of Concord, and Mr. George C. Wright, of West Acton, all of which they visited.

Mr. John R. Poor's orchard was one of 286 trees, 136 of which were offered for premium. They were planted in 1863; they were, when set, well-grown, handsome trees, and have been so well cared for as not to have been checked in growth. They were remarkably uniform in size and shape. For a statement of how they were planted and cultivated, we would refer to the instructive account given by Mr. Poor.

All the varieties, as by Mr. Poor's statement, your Committee found showing most perfect fruit. From what we saw as the effect of his skill in cultivation of this fruit, we do not hesitate to recommend a careful consideration to all who wish success in this, what may be made, most profitable branch of orchard culture.

The orchard of Mr. Davis was found to have received the society's first premium last year, and therefore debarred receiving one this year. This orchard was found in the hands of a skilful cultivator, and for its age would compare favorably with any orchard in the county. It would well pay for a visit to one about commencing an orchard, whether to learn how best to plant, or what varieties to select.

Mr. Wheeler's orchard was one of 378 trees, part of them having been planted some eleven or twelve years; the balance, say 84 trees, were set two years ago. This orchard was found to be truly a model orchard in all its arrangements—neatly kept and skilfully cultivated, nothing lacking and nothing overdone. This will no doubt be the most profitable part of Mr. Wheeler's farm. Those who in the vicinity of Concord wish to learn how best to grow pears, will do well to call and examine this orchard and consult its intelligent owner.

The orchard of Mr. Wright was found in the hands of one who had made a wise selection of soil, and who has bestowed on it a liberal amount of labor. His trees, however, showed a want of practice in skilful pruning. They were not in fruiting condition. We have no doubt Mr. Wright will in a few years show a very fine pear orchard.

The Committee award the first premium for the best pear orchard to John R. Poor, of Somerville; the second premium to Edwin Wheeler, of Concord.

Only one peach orchard was offered for premium in this class. Messrs. E. Bunce & Son, of Westford, offered an orchard that was found in a very thriving condition, never, however, having produced any fruit. While your Committee award to this orchard the second premium, they very much doubt the wisdom of giving premiums for a fruit that has proved so emphatically a failure in all New England.

Of all orchard culture for the Middlesex farmer, no one at present promises to pay so well as the pear. The almost certainty of a crop, and the high price in market of the fruit, will, or should, encourage to more extensive cultivation. From what has been learned from our exhibitions, statements and reports, the farmers of our county may plant this fruit with a confidence such as no other orchard fruit will give. Never before were so many pears raised, never was the price so high. With skill, careful and liberal cultivation, with an intelligent selection of varieties adapted to situations and soil, a most reliable source of profit will be found from the pear orchard.

After a most diligent inquiry, it will be found that few, very few, varieties, well chosen, will prove much more profitable for general culture than many sorts. For net profit we shall not always be wise in choosing such as are pronounced the best for the table. Some that are valued only as cooking pears are truly the best paying. Such, in fact, is the old Belle or Windsor, a stout, vigorous grower and profuse bearer, early and large, always selling readlly, and at good prices. Such, also, is the Vicar of Winkfield, one of the most vigorous growers both on quince and pear roots. The Bartlett has obtained such a reputation, and its season is so short, that, from over-stock in the market, it often sells as low or lower than any other variety.

In planting any considerable number of trees for orchard culture, regard should be had to the season of ripening, and to the time the variety will keep in a marketable condition. For summer pears the Rostiezer is among the best, as also Beurre Gifford and perhaps the Brandywine. For fall, we should take from the Louise Bonne de Jersey, Duchesse, Seckel, Urbaniste, Beurre d'Anjou and Beurre Langlier. For winter, Lawrence, Winter Nelis and Vicar of Winkfield. Many sorts, that only a few years since were placed among the first to cultivate, are now entirely discarded. Such are the Beurre Diel, Dix, Beurre Easter, and by many the Flemish Beauty.

With regard to apple orchards, we think with a favorable winter this year we may hope to recover somewhat our confidence in this important branch of husbandry. Various reasons have been assigned as the causes of failure of the crop for the last few years. There is no doubt that a combination of causes produced the result. A combination of hard winters, followed by very dry summers, appears to be the most reasonable theory that has as yet been advanced. If this is correct we may reasonably hope to have a good crop of apples the coming year, and that we shall again enjoy the sight of our orchards loaded with this golden fruit.

For the Committee,

J. CUMMINGS, Jr., *Chairman.*

Statement of John R. Poor.

Gentlemen:—In reply to yours, asking me to give you my mode of cultivating a pear orchard, time of planting, distance, and varieties best adapted to general cultivation, manner and mode of tillage, I will here say: First, that in cultivating my pear orchards I have applied various modes, and after experimenting for twenty years, am fully satisfied that the only true way is by first having the land prepared for two years before a tree is set. The land should be well worked and highly manured, even if the soil be rich; the second year it should be subsoiled, say eighteen to twenty-four inches deep, which can be done as well with a plough and much cheaper than with a spade, and if the land be low, wet or has springs near the surface, it should be well underdrained.

Second, the best time for planting I have found to be in the autumn, as soon as the tree has cast its leaves. Third, distance for a garden ten by ten feet; distance for an orchard sixteen by sixteen feet; and in the form of a diamond or triangle.

In regard to varieties all depends on location and soil, and for any one to say to another that this, that, or the other variety is the best for them to cultivate, is very much like telling a person what they must eat or wear. But with me the Bartlett, Louise Bonne de Jersey, Beurre d'Anjou, Duchesse d'Angoulème, Belle Lucrative, Andrews, Swan's Orange, Urbaniste, Langlier and Lawrence have almost invariably proved desirable for general culture, making ten varieties; and next come St. Michael Archange, Maria Louisa, Beurre Bosc, Passe Colmar, Doyenne Boussock, Seckel, Vicar of Winkfield, Beurre Gris d'Hiver, Winter Nelis and Glout Morceau—ten—in all twenty varieties. While the Beurre Easter, St. Michael, Beurre Diel, Dix, Beurre d'Aremburg and Flemish Beauty, are not worthy of cultivation. There are other varieties that I think will prove well, say Clapp's Favorite, Beurre Clargeau and Doyenne Comice.

As to manures to be used every one must be governed by his own judgment, for it is by years of experience only that a man can best judge of the kind of manure adapted to the soil on which it is to be used. I have used all sorts to be had, and applied freely, and after the trees have been set one year I do not think there is danger of injury from any amount that may be applied.

Now, sir, to sum up the whole matter, my experience would allow me to write a large volume; but all can be said in a few words. First, see that the land is well cultivated, drained and manured. Second, select what appears best as to variety, and use great care in setting, and keep the roots as near as possible to the surface for standards. Dwarfs should be set, with the pear stock, three inches in the ground. Third, set in the fall, as soon as the leaves are off, then drive three stakes and tie the tree to them, that it may be kept in the desired position, then mulch with coarse straw, thatch or corn stalks, and leave them on until decayed. Fourth, begin to prune while the tree is young, and cut freely if a good form is desired, for by so doing the tree will not be injured, and can be much better done than if left until the tree has had years of growth. Fifth, while the tree is young do not allow it to bear much, if any, fruit. Sixth, keep the ground light by cultivating potatoes or roots in the rows.

The orchard you looked at on my place has one hundred and fifty trees, set in rows or lines twelve feet distant, and the rows eight feet; one hundred and thirty-six trees eight feet distant, in rows or lines, and rows twelve feet.

SOMERVILLE, January 7, 1867.

Statement of Edwin Wheeler.

Gentlemen:—The orchard which your attention is respectfully called to, contains one and one-half acres of land and three hundred and seventy-eight trees; eighty-eight are on pear stocks, the balance on quince, and were set as follows: Eighty-four were set in the springs of 1853–54, on sward land—a plan I would not recommend any one to follow—by digging holes about four feet in diameter and one-and-a-half deep, using mud and compost about them. The rows set seventeen feet apart and ten feet apart in the rows; the trees alternate on pear and quince. These eighty-four trees contained nearly twenty varieties, which was about double that I bargained for—a way I have seen since practised on too many occasions, by those who sell trees to persons who do not know one variety from another, as was my case at that time. Of these eighty-four trees sixteen were Bartletts. I lost by the hard winter of 1857 nine of these, and the others were more or less injured, which discouraged me for a long time in trying to raise Bartlett pears, and has given that part of the orchard an unpleasant appearance by being filled out with trees of different sizes.

In the fall of 1863 and spring of 1864, I set eighty-four more, and to this part of the orchard I would particularly call your attention, as that which I present for your premium. They were planted the same distance apart as the above lot, on pear and quince stocks, the ground having been cultivated with corn and potatoes the year previous, and manured only for those crops. The holes for the trees I dug as previously stated, set the standards the same depth as they set in the nursery, and the quince stocks about three inches below where they were budded, using no manure or compost at the time of planting, but applied a liberal quantity broadcast before ploughing for roots, with which it has been cultivated. My practice now is to manure in the fall with twenty or twenty-five horse-cart loads per acre, broadcast, and plough it in twelve or fifteen inches deep, where the plough will not interfere with the roots of the tree, turning my back furrows against the trees, and thereby forming a protection through the winter to the trees both against mice and water. In the spring I turn the furrows back, and this leaves the land level and in fine condition.

In the spring of 1865, I planted one hundred and eighty-seven trees, all on quince stocks; rows twelve feet apart, and ten feet apart in the rows. Last spring I set twenty-one more, same as above, which filled out the piece. These were planted as the dwarfs in the above statement, and contain but three varieties, viz.: one-half Louise Bonne de Jersey, the balance Beurre d'Anjou and Duchesse d'Angouleme. I think these the most profitable for orchard culture on quince stocks I have, among twenty-five varieties, which, in my opinion, is quite too many for any one but an amateur; but as I have them, not from choice, I have left one or two of a kind, not for profit but variety.

The price paid for the trees varied from forty cents to one dollar and a half, according to kind, size and quality. From my limited experience I have no doubt that any one, with proper care, gets back both principal and interest sooner on trees that cost one dollar and a half, than fifty cent ones, besides saving time and labor. There is one great disadvantage, however, in buying trees of larger growth, rather than those of one or two years from the bud, viz.: the manner in which they have been pruned, or rather not pruned at all, but allowed to stand too thick in nursery rows, and grow up more like bean poles than fruit trees in many cases, while in others they are crooked and anything but pyramidal in form as they should be.

I prune now in April or May, in pyramid form, before the leaves are fully developed, heading them in one-half the previous year's growth, especially the dwarfs, and pinching back some of the most growing branches during the summer, thereby forming better and stronger trees, which are not so easily disturbed by the wind, and the fruit is not shaken off so readily as when the branches are long and slender. My trees have never been troubled to any amount by insects of any kind, and in only two or three instances by the blight. Two years ago the past summer, one tree, a Glout Morceau, planted in 1853, was attacked by the blight, killing one-third of the tree. This part was immediately removed by sawing off the branches and burning them. One year ago it was attacked in the same way, though not so severely, and received the same treatment; this season the remainder of the tree is growing well and bearing fruit.

The soil is what would be called a black, heavy loam, too wet and cold for a good crop of corn, four years in five. In the fall of 1863, I commenced draining with two-inch tile, and laid about one-half of the piece, laying the drains thirty-four feet apart or midway between every other row of trees, and about three feet deep. The effect of this was so plainly seen the following season, that in the fall of 1864, I laid the remainder of the piece thirty-six feet apart, or so as to come between every third row of trees, which are dwarfs. The expense of draining the piece I cannot now state, but think it a better investment than if put in the $7\frac{3}{10}$'s government bonds.

CONCORD, September 10, 1866.

Statement of E. Bunce & Son.

The peach orchard, of one hundred and forty-eight trees, which we offer for inspection and premium, if found worthy, was set May 1, 1862, on dry, gravelly land, sloping to the south and west. The trees were crooked and unsalable ones from the nursery, headed in severely and set eight feet apart. The first year we planted the ground with corn, second year with beans; since then it has not been planted. In 1863–64–65, the trees received, each, one shovelful of compost from the barn cellar, worked into the ground at the first hoeing in the spring. One-half of them also received one pint of wood ashes in the spring of 1864. Have kept the ground cultivated with cultivator and hoe. Have not been troubled with insects, excepting a few borers which have been taken out with a knife. About half a dozen of the trees, where most exposed, died from the freezing of the roots last winter, and we think it would be well to protect them through the winter with some sort of mulching, in such situations. Each year, in October, have headed in from one-third to one-half of the previous summer's growth.

Varieties, Early Chelmsford, Early York, Early Washington, Ives' Early Melocoton, New York Rareripe, Early Crawford, Lincoln, Smith's Favorite, Old Mixon, (freestone,) Bergen's Yellow, Lemon Rareripe and Late Crawford.

WESTFORD, September 1, 1866.

WORCESTER NORTH.

From the Report of the Committee on Pear Orchards.

But one orchard was entered for premium—that of Dr. Thomas Palmer, situated on Summer Street, in Fitchburg. The duties of this Committee, therefore, were not burdensome, and we very readily came to the conclusion to award to Dr. Palmer the highest premium offered by the society. We found in this orchard many things to commend—the location, preparation of the land, plan and order of setting, the varieties, manure, trimming, &c. We recommend a careful reading of the statement of Dr. Palmer to those who are interested in this department of fruit-growing. We believe that he deserves much praise for having carried out so faithfully his plan for a good pear orchard, and only hope that it may be an incentive for others to commence a similar good work. Who does not like a well-ripened, delicious pear—an Early Summer, Bartlett, Seckel, Flemish Beauty, Louise Bonne de Jersey? All doubtless admire the beauty of fine trees and the luxury of good fruit, yet but few who can do so are willing to put forth the necessary exertion and painstaking to raise it. The idea may have been somewhat prevalent that raising pears was to be attempted only by a few, and that the pear could not come into general cultivation, like the apple. This, we believe, is not correct. The pear tree is as hardy in New England as the apple tree, and for the past five years the raising of pears in Massachusetts has been quite as profitable as raising apples, requiring no more care than ought to be given to other fruits in this climate.

Your Committee would recommend setting out *good* pear trees, and no other. It certainly does not pay to set poor trees. Look at the roots and the healthfulness of the bark, which will tell whether the tree is two years old, or has been rejected over and over by good judges, and finally packed off to be sold to new beginners. Without doubt thousands of such trees have been sold by travelling dealers in this vicinity, that were worthless, and have therefore disappointed the buyer. Again, we say set pear trees, but set *good* ones or none; and, when set, do not think the work is done. Nurse them, dig about them, and take as much care of them *each year* as a good farmer would take, and must take, to get a good crop of corn, and we believe that your labors will be rewarded.

JAMES M. WOODBURY, *Chairman.*

Statement of Dr. Thomas Palmer, of Fitchburg.

My pear orchard is set on the *modern quincunx* plan of mixed standards and dwarfs, containing three hundred and twenty-six trees, one hundred and sixteen on pear stocks, and two hundred and ten on quince stocks, standing on thirty thousand square feet of land, being less than three-fourths of an acre, and is located on my fruitland farm, on Summer Street, near the village of Fitchburg.

This orchard was set in the spring of 1863. The soil is a deep yellow, with clay subsoil, sloping to the south-east. It had formerly been used for grass crops. It was ploughed in the spring. The trees were set fifteen inches deep, and all stones removed. After setting the trees, it was planted with potatoes, with the usual amount of manure for potato crop spread on, and no manure put under the trees when set. Each year since there has been as much manure spread on and ploughed in as is usually put on corn ground, and cropped with squashes, tomatoes, onions and strawberries, as much as though there were no trees. The trees were two years old when set, and were obtained from the Geneva Nurseries, New York.

An orchard set on the quincunx plan forms rows and alleys running in every direction, rendering it advantageous in cultivating the ground with the horse-hoe, leaving the standard trees in a position one in the centre of four, eighteen feet apart, with dwarfs between, in such a manner that all the trees are ten feet four inches from each other, giving sufficient room for growth and cultivation. T. PALMER.

FITCHBURG, October 1, 1866.

NORFOLK.

From the Report on Fruit Trees.

On the 18th of September, notice was received from the Secretary that Joseph H. Billings, Esq., of West Roxbury, had invited the Committee to examine his pear orchard, with reference to the premium of the society. The Committee spent about three hours among his trees, with much interest and profit, noticing all the particulars of soil, planting, pruning, manuring and culture, which have resulted in the thrifty and beautiful trees now enriching the grounds of Mr. Billings.

There are nearly four hundred trees, not planted together, but occupying different positions on the grounds, suited to the soil and exposure. The attention of the Committee was especially attracted by the strong and vigorous habit of the trees, and by their symmetry of shape. The form is pyramidal. Commencing to branch about a foot from the ground, they are filled to the very tops with strong, healthy wood, not crowded and interlaced, but open to receive the full benefit of the sun, and at the same time shading the trunk from its too intense rays, and thus, perhaps, preventing the "blight," not more than two or three instances of which were visible in this whole collection of trees.

The Committee are able to account for the thriftiness of these trees in the following manner:—

1st. They are not crowded together, but are allowed room to feel the full effects of the sun on their tops, and the full benefit of the soil on their roots. A great mistake is made in crowding trees too closely together. With some the rule is to plant trees on the quince eight feet apart; but when they feel the effect of the pear roots, and begin to spread, every other tree must be sacrificed. In our opinion, the distance apart, even for those on the quince, should not be less than twelve feet. 2d. For the most part, the soil is trenched and drained—thus deepened and pulverized; and sweetened by the removal of all superfluous moisture, it is prepared to insure a healthy and vigorous growth. 3d. The Committee are inclined to attribute, in no small degree, the healthiness and beauty of these trees to the system of pruning adopted. They have been under the care of Mr. Robert Watt, of West Roxbury, who has exercised great skill and care in their culture. Mr. Watt seems fully aware of the advantages gained by the pyramidal growth of the pear; he relieves the tree of all superfluous wood, shortens in the last year's growth, especially the leading rampant shoots, always cutting back close to a bud, *selecting, in every instance, an outside bud*, that the growth may be outward and not inward; and by thus cutting the outside of the tree, the strength is not expended in terminal buds, the sap is evenly distributed, and the fruit-buds are thrown inward in a wonderful manner, and equally scattered over the whole tree.

We had hoped for a statement from Mr. Watt, embodying his system of pruning, for insertion here, which would have been interesting and instructive, but have failed to obtain it.

Mr. Billings has furnished the following particulars respecting his pear trees: "I have about 325 trees. The varieties are generally the eighteen kinds recommended for general cultivation by the Massachusetts Agricultural Club, being the best varieties of early, medium and late pears. A little more than half of the soil occupied by my pear trees has been spaded and drained, the balance in common cultivation. The trees do the best where spaded and drained. The manure used has generally been our common stable manure. I have occasionally used wood ashes, and sometimes a top-dressing of street scrapings, or the wash of the roads."

The Committee here insert a list of the varieties referred to by Mr. Billings, as recommended by the Massachusetts Agricultural Club, knowing of no body of men in the country better qualified, from long experience and extensive and successful cultivation, to recommend a list of varieties for this locality.

List of Pears for general Cultivation, recommended by the Massachusetts Agricultural Club, January, 1867.

BEST SIX VARIETIES.

Bartlett, ...	September.	Merriam, ...	Sept. and Oct.
Seckel, ...	September.	Sheldon, ...	Oct. and Nov.
Urbaniste, ...	Sept. and Oct.	Beurre D'Anjou, . .	Nov. and Dec.

SECOND BEST.

Brandywine, . . .	August.	Howell, ...	October.
Doyenne Boussock, .	September.	Beurre Bosc, . . .	Oct. and Nov.
Swan's Orange, . .	October.	Lawrence, ...	December.

THIRD BEST.

Belle Lucrative, . .	September.	Maria Louise, . . .	October.
Paradise D'Automne,	September.	Beurre Clairgeau, .	October.
Beurre Superfin, . .	Sept. and Oct.	Vicar of Winkfield, .	December.

A. K. TEELE, *Chairman.*

MILTON, December 6, 1866.

VINEYARDS.

MIDDLESEX.

From the Report of the Committee.

The Committee visited four vineyards, two in Concord and one in Lincoln, on the 4th day of October, and one in Cambridgeport on the 5th. After much deliberation they decided unanimously to award the premium of $20 to John B. Moore, of Concord, for the best and most economical method of cultivating hardy grapes. The Committee gave the preference to his grapes for fineness of flavor. They were satisfied that his method of pruning, staking, tying and training his vines was the best and most economical. The Committee viewed the vineyard of Mr. Thomas F. Hunt with much pleasure, and would unanimously recommend that a gratuity of $15 be paid to him for his laudable efforts to promote grape culture in this county, and for his able and interesting statement. It was a very grave question to decide between the vineyards in Concord.

The Committee next visited the vineyard of Mr. Henry Derby, in Lincoln, where they saw some beautiful vines and clusters of large berries. Mr. Derby is much devoted to grape culture, and rapidly bringing his vineyard to a high state of improvement. All the above grapes were the Concord variety, and are well worth a visit for those wishing information on hardy grape culture.

The last vineyard visited by the Committee was that of Messrs. Davis & Bates, in Cambridgeport. The season was so far advanced that more than half the fruit had been removed, so that it was not seen to advantage. The fruit in their vineyard came to maturity so early, the locality being a very warm one, that they had commenced gathering it long before the Committee's visit. They can show every variety of hardy grape, and give every information of its season for ripening, in Massachusetts. Their place is a perfect model for neatness and economy of ground, for grape and pear culture in a city, and is well worthy of being visited and imitated by every amateur, especially those who have only a small garden. Their vines are trained upon a trellis a foot from a fence ten feet high, which incloses their whole grounds.

Although grape culture is still but a small item in the agriculture of Middlesex County, nevertheless, an auspicious beginning at least has been made, as is evident from the fact that one, now famous, variety of hardy grape, better suited than any other to our northern and western climate, originated with a Middlesex vine culturist. Hon. E. W. Bull, the gentleman who originated the Concord grape, which has been awarded the "Greeley prize," as being the best variety for general cultivation, estimates the number of acres devoted to grape culture in this county to be more than fifty. When the profitable nature of the grape crop is taken into consideration, and the fact that the successful culture of the grape in the greater part of this country is no longer a doubtful problem, we are sure that hundreds of acres of Middlesex soil, fit for nothing else, will ere long be devoted to the growth of this delicious fruit.

When an acre of ground is once set out with vines and has become productive, it is easier to take care of than ground planted with any other crop. Corn demands far more care and a better soil, while the product of an acre planted with corn is worth but a trifle, compared with a grape harvest from a much less space. Cheap land, not worth more than twenty dollars an acre, will answer every purpose of a vineyard. Redding, a great authority on wines, says that good, rich soil, never produces even tolerable wines. It will be seen from one of the Concord statements, accompanying this report, that one-half acre of waste pasture land, after being turned into a vineyard, was made to yield, from 356 vines, 3,592 pounds of grapes, sufficient to bring the sum of $1,243.20. The same ground planted with corn and yielding at the rate of eighty bushel to the acre—which is a very generous yield of corn—would produce a crop worth only sixty dollars, even at the present high price of corn. Balance in favor of grape culture, $1,183.20. Your Committee are also happy to say that two thousand cuttings are also raised on the same land, which, at one year old, can readily be sold at twelve cents apiece, making $240 additional. Total, $1,483.20, from half an acre of land.

To corroborate Mr. Hunt we have the statement of J. B. Moore, Esq., to show what he did in 1865, the year that was not supposed to be a good grape season. He writes as follows: "From the older vines I cut, weighed and sold, last year, from one-fourth of an acre, which was planted four years previous, 2,900 pounds, at twenty cents per pound, amounting to $580.

Downing says that all that can be said for a soil for grape culture is that it be light, rich and dry. Open air grape culture can be made a most profitable pursuit with us, and doubtless will be at no distant date. An intelligent farmer, with a vineyard of an acre or less in extent, with a little labor will soon find himself in the receipt of a handsome income from that source alone. Grapes this year have brought an average of twenty cents a pound, and the demand for them is constantly increasing. The purpose for which grapes will be raised here, will, of course, be mostly for the table. Pure wine from the Concord grape is both a healthful and delicious beverage, and finds ready sale at remunerative prices. A writer on this subject says of the future prospects of grape culture, " of its extent and influences it would be difficult to speak. But we feel assured that whether in the form of wine or of fruit, the produce of the vine cannot fail to do much good in this country—not the least of its advantages being that it will afford those with small capital a very pleasant mode of securing a competency."

In vine culture, after the first great effort has been made to get the soil suitably prepared, there is really little hard work to be done. The wild grape-vines were among the first objects that attracted the attention of the early voyagers to our coast. They were seen growing in such profusion that the country was called Vineland. Daniel Webster once made the remark that we could never hope to raise good wine on this continent, and that it would always pay us better to raise corn, cotton, &c., and buy our wines and silks. California is likely to controvert the assertion of the great statesman. Indeed, she has already done so, with her annual product of two million gallons of wine. The Jesuit missionaries in California, and on the Pacific coast, and the French and Swiss settlers in our Western States, were the first planters of vineyards in the New World. But the great turning-point of vine culture in America was when the Catawba grape was introduced by Major Adlum, who considered that he conferred greater benefit in so doing upon the American nation than he would have done by paying off the national debt—of that day, of course, and not the present national debt.

Large tracts of cheap, almost waste, pasture land throughout New England could be turned to good account by cultivating them with grapes. Not that we suppose that grape culture among us will ever be the paramount object it is on the Rhine, or the sunny terraces of France, or in the long, dry summers of California, or on the banks of the Ohio River, which has been called the American Rhine. But the hardy varieties of the grape can be easily cultivated here, and no fruit is more invigorating or healthful. A grape diet has been prescribed to cure almost hopeless cases of disease, and with success. Pure wine is a great desideratum here, to check the too free use of distilled liquors—which may be called the bane of our community.

Our limits will only permit us to indulge in some general observations. We hope that the intelligent farmers of Middlesex County will think this subject worthy of their attention, and will not fail to provide themselves with some of the standard works on grape culture. The valuable reports issued from the Department of Agriculture generally contain most interesting essays on the subject in its various aspects. We can only glance cursorily at one or two points. It will be seen by the statement of Mr. Derby, of Lincoln, that he used green manure from the hogpen. His berries were large and juicy, and looked better for the market when freshly gathered than the others submitted for inspection. But in one week after they were received by the chairman of your Committee, they began to shrink up and to taste insipid, and to-day, (December 20,) they have all fallen from the stem and shrunk up, nothing but their skins remaining. A box of the same kind of grapes, (Concord,) which were received at the same time from Mr. John B. Moore, of Concord, who used unleached ashes to fertilize his vines, still remain on their stems and are plump. Their flavor is still good, although it has lost some of its sprightliness. A box received last week from Mr. Hunt we find in good condition. In the opinion of the chairman of your Committee, the difference in favor of the last mentioned grapes is attributed to the use of wood ashes for manure, instead of a gross, rich compost. Ashes of wood, whether leached or unleached, are a powerful manure for the vine, and probably contain all that it requires. Leached ashes may be applied as a top-dressing in almost any quantity with excellent effect, but a more cautious use must be made of unleached ashes, they being much more powerful and caustic. Grapes undoubtedly possess the finest flavor when newly gathered, but their season may be prolonged, if not in its full excellence, yet with sufficient attraction to make it worth while. With proper care grapes may be kept until Christmas, and at that time will command a price which would not be paid for fresh fruit during the highest of the grape season. As yet, the preserving of the fruit seems to be but little understood. Grapes packed in small boxes, containing not more than five pounds, with layers of paper between the bunches, keep best; dry sawdust and cotton were each tried with very unfavorable results.

The method of raising vines on cedar stakes, at nine cents each, about six inches in diameter, which will last ten years, is much more economical than on trellises for farmers' out-door culture. The chairman of your Committee is convinced, from his own observation and experience, that Rogers' Nos. 15 and 19 will prove valuable additions to the list of hardy grapes cultivated in Massachusetts.

PETER LAWSON,
HENRY L. SHATTUCK,
Committee.

Statement of John B. Moore.

The grape vines on the east side of my vineyard, containing one hundred vines, are all of one variety, viz., the Concord. The lot is described as follows: Aspect, south-east, with a gentle slope; soil, light sandy loam, underlaid with red loam and gravel; it was cleared up about eight years ago. At that time it was covered with a growth of small pitch-pine, birches and scrub-oak trees, and not worth more than $20 per acre. The wood was cut, brush burned, and the lot ploughed ten or twelve inches deep, and planted every year, until 1864, with corn, potatoes, beans, squashes, &c. During the time that it was planted it was well manured, yearly, with a compost made of peat and manure. Since the spring of 1863 there has been no manure of any sort put on the lot, except one peck of leached ashes to a vine last spring.

I have briefly stated to you the nature of the soil, the previous crops, the former condition of the land, its value and the manuring. And when I say well manured, I mean, as near as I can judge, thirty horse-cart loads of compost to the acre, which gave a fine crop of corn, and a small yield of potatoes, for which the land was not so well adapted.

In the spring of 1864 I had the land ploughed ten or twelve inches deep, which I judge from my own experience is sufficiently deep for all practical purposes, and is really a better preparation in our climate than trenching deeper. If you trench or otherwise prepare the soil, twenty inches or two feet deep, I admit you make a larger pasture or feeding ground for the roots of the vine ; but when the fruit comes to ripen, my experience has been, (and I have thoroughly tried the experiment,) that it will take more than one week longer to ripen the crop on trenched ground, because the roots run deeper, and do not get the full benefit of the sun's heat.

All writers and cultivators of the grape here at the North tell the new beginner to select a warm, sunny piece of land for a vineyard. And why ? Because, to produce fruit to perfection, there must be a considerable amount of heat at the root. This is undoubtedly true. Then why prepare the soil so as to encourage the roots to run so deep as to lose the benefit of the very thing you have selected a sunny exposure for, viz., heat ?

The land having been ploughed as I stated, was harrowed ; the rows measured off ten feet wide, and furrowed twice in a row, and straight. I then have a small line with a white string run through it at every six feet, which is tied to the stakes at the furrows, and stretched fairly over the same ; then with shovels or spades a hole is opened directly under the white strings, leaving it a little higher in the centre than at the outside, and sufficiently large to spread all the roots out evenly, and immediately plant the vines while the dirt is fresh and moist, the top of the vines under the white strings, which makes straight rows, and the vines at an equal distance. This is the best, most satisfactory and expeditious method of planting vines among all others that I have tried.

As to trimming, you will see that I have tried a method of coiling the vine around strong stakes or posts, two to each vine, set two and one-half feet apart, and growing two arms from the main stem of the vine, which are eventually spur trimmed, one of which is tied to each stake, for two purposes : first, to check the sap and keep the bottom spurs strong ; second, it prevents the chafing of the tyings, and keeps them securely on the poles.

This method of pruning, using strong stakes, has so far succeeded well with me. You will observe that I use good strong stakes, that will last at least ten years, and not a small, weak pole, that often rots and breaks down the first year. I do not claim that this is the best method of pruning, although I have tried many of the different methods recommended ; but, so far, am better satisfied with this than with any other that I have tried. I have not used sulphur or other applications to prevent mildew, and you will see that the foliage is reasonably healthy and perfect.

Now, with economy in preparation of the soil, using land that was not costly, but well adapted to the purpose, a method of pruning that does not require a large amount of tying, a variety that is absolutely hardy, and not requiring winter protection, the grape can be grown at a large profit, even at six cents a pound. This, with the great certainty of a crop, the short space of time in which vines can be brought into bearing, makes the grape, in my judgment, one of the most desirable and profitable fruits to raise.

In answer to inquiries, I will say that the cedar stakes cost seven cents each, delivered at my place ; size from three to six inches in diameter at the top, and eight feet long. Then, as to crop : last year they produced but very few ;—I now have reference to the 100 vines shown for premium ;—this year, 908 pounds, being a fraction over nine pounds to a vine, were sold for twenty cents a pound, amounting to \$181.60, averaging $\$1.81\frac{6}{10}$ to a vine. You will remember that my man cut and weighed the product of one vine, which was one of the 100 vines offered for premium, when the Committee was at my place, upon which there were fifteen and three-fourths pounds, planted two years ago last spring. In answer to your questions as to cost, such vines as I planted were worth \$15 per hundred. The cost of planting is about two cents a vine, after the ground is prepared. The cost of hoeing, and other cultivation from the time of planting the vine up to the time of gathering the first crop I cannot tell accurately, but it is certainly less than the same land would be in corn ; in fact it cost me nothing, as I grew vines between the rows, that have paid me well for all the work of cultivation.

Of the older vines, I weighed and sold last year, from one-fourth of an acre planted four years previous, 2,900 pounds; these were all sold and delivered within ten days after picking, for twenty cents a pound, amounting to $580. There were also some few pounds of an inferior quality not sold.

CONCORD, September 10, 1866.

Statement of Thomas F. Hunt.

The vineyard which I offer for consideration, for the purpose of showing, and illustrating my method of cultivating hardy grapes, is located upon the southern slope of Ponkawtasset Hill. The soil is a light gravelly loam, a part of it very stony, stones of all sizes, some weighing two or three tons. About one-half the ground was covered with whortleberry bushes, briers, and some small pitch-pine trees, and I suppose was never ploughed until it came into my possession.

Preparation of the soil: The ground was cleared of brush, wood and stone, and ploughed ten inches deep; stable manure composted with swamp muck, at the rate of thirty cart-loads to the acre, spread and covered with the harrow, and potatoes planted. The following spring, manured as before. The ground was then ready for the vines, which were set in rows running east and west, eight feet apart and seven feet in the rows. The variety planted is the Concord.

Setting the vines: I threw out the soil as deep as planted, and in circumference from three to six feet, according to size of plant, and with pick or bar loosened the subsoil ten inches deep; I then threw back a part of the soil, crowning it a little in the centre; upon this spread the roots evenly, covering them with the best soil. Some vineyardist of reputed experience recommends deep trenching and high manuring. They should also add, a long purse well filled. This may be the best method for some varieties of grape, or where the object is merely for show; but for open culture in our vineyards, whether of large or small extent, it will not pay. My method of training in the vineyard is upon stakes, two to each vine; it is cheaper than the trellis, and the ground is much more readily kept in order, as there is nothing to prevent running my cultivator either way, which leaves but little for the hoe, and the vine is accessible at all points for the purpose of pruning or gathering the fruit without passing to either end of a trellis.

For the first two years—if one year old plants—I usually plant a single row of cuttings, turnips, carrots or beans; turn a furrow midway of the rows; into this I put fine compost; the ground is frequently stirred and the weeds kept down, the crop paying the expense of cultivation. For the third year the fruit will pay it.

The portion of my vineyard that I offer for your consideration contains some two hundred vines, from two to eight years old, and for convenience, I will divide them into four classes.

Class 1, was planted out at one year from the cutting; after the leaves fell they were cut back two or three buds; the second year they were allowed to trail upon the ground without any summer pruning. My aim is to get strong, healthy and vigorous roots, before training the vine for fruiting. At my annual or winter pruning, I select two of the most vigorous and healthy shoots for training to the stakes, cut them back, leaving six or eight eyes; they are now ready for the stakes.

Class 2, were three year old vines; the process has been the same as in class one, with this exception: at my annual pruning I left upon each vine one shoot for layering. As soon as the frost is out of the ground I set my stakes two or three feet apart, winding my short canes around the stakes, which prevents somewhat the too free flow of sap to the upper part of the vine, and gives more vigor to the lower portion; the strongest of the two upper shoots of each cane is allowed to run to the top of the stakes, for the continuation of the cane, and there stopped. All laterals are nipped at the second leaf, and all shoots from the cane of last year's growth at the sixth or eighth leaf. A few bunches of fruit are allowed to mature. At the close of this year commences my method of pruning bearing vines, which is as follows: spur all arms to two eyes, giving to each cane an equal number; cut back the canes of the present year's growth according to the strength and vigor of the vine.

The 3d class was set at the same time as the preceding, but were two years old when set, and have been pruned as stated in class two. At the commencement of the fourth season, or as soon as the buds have pushed a few inches, I rub off all that I do not wish to retain for fruiting or spurring, and as soon as the fruit is set, nip at the third leaf from the last bunch of fruit; and all shoots intended for spurring, at the sixth or eighth leaf, taking the strongest growers first; also remove the tendril and all weak and watery shoots. At the annual pruning I find, instead of a spur or arm, a spur with two arms; the second I cut off, and spur the first to two eyes.

Class 4, are vines fully established, some of which are eight years old. The preparation of the ground has been the same throughout the entire vineyard. To the first, second and first four rows of the third class there has not been any fertilizing matter applied, except as stated for cuttings, &c., since the vines were set. To the remaining part of the vineyard I gave to each vine three quarts of unleached wood ashes, or at the rate of sixty bushels to the acre; and to about 160 of the first planted vines two light dressings of ashes, previously applied at different periods.

The last has been the most unfruitful season of any since I have had anything to do with grape culture. On 150 of my vines but very little fruit set, in consequence, as I think in part, of their having carried three very heavy successive crops. The season opened quite early and very warm, and was followed by wet and cold weather. This I believe to be the cause of the blight which reduced my crop one-half. And this explains the difference in the amount of product the last two years. For this year I cannot give the amount as the fruit has not been gathered.

The following exhibit shows the estimated value of the land, and the cost of preparing the same, planting, setting and staking the vines; also, the actual amount of produce from all vines of four years old and upward, the average weight and value per vine, and the aggregate per acre, for 1863–64–65, and for the three years.

One acre of land, estimated value,	$40 00
Ploughing and manure,	60 00
Interest for three years,	18 00
777 vines, at 20 cents,	155 40
Setting the same, at 25c.; staking at 10c.,	194 25
Total,	$467 65

	No. of vines.	Produce, pounds.	Average produce per vine.	Price per pound.	Value per vine.	Agg'te per acre.
1863, cut from . .	268	1,971	7	12½	$1 12	$870 24
1864, cut from . .	356	3,592	10	16⅔	1 60	1,243 20
1865, cut from . .	596	2,500	6⅓	18	1 01	784 77
Average for three yrs.,	–	–	$7\frac{7}{9}$	16	$1 24	$966 07

CONCORD, September 20, 1866.

Statement of Henry Derby.

The land selected was an exceedingly rough and rocky piece of pasture on the south-easterly side of a hill. In the spring of 1862 I cut the wood and brush, and burnt the brush on the ground, and then broke it up with a yoke of oxen. I then set my rows ten feet each way, taking a grub-hoe to cut out the furrow long enough to take in the roots, filling up between the rows with potatoes, manured in the hill. This piece contains 140 vines.

The first year I cut back, leaving one eye; the second year leaving two eyes; after that they were trellised up on two stakes at each hill. The third year I sold $46 worth of grapes; last year the sales amounted to $266. I have applied fertilizers but twice during the four years. The first was two shovelsful to each hill; this spring I spread a little compost and cultivated it in. I lost about half my crop last year by blight. The fruit on the best hills average twenty-eight pounds to the hill.

LINCOLN, September 10, 1866.

Statement of Hervey Davis.

The grapery which I offer for premium consists of about two hundred vines, comprising about fifteen varieties, all of them ripening well. The first to ripen was the Adirondac, which was perfectly ripe the 3d of September; the second was the Hartford Prolific, which was about ten days later, and the Framingham Seedling about the same time; next the Delaware, and then the Concord; Creveling about the same as the Hartford. I think the Creveling one of the best grapes grown in the open air. It ripens early and hangs on well. The only objection to it is its rather thin bunches, which it is said will improve as the vines becomes older. Rogers' Nos. 4 and 15 I consider worthy of a thorough trial. I have fruited them for two years and find them first-rate, and they have ripened early. The Allen's Hybrid is another fine grape, and if it proves hardy and reliable, no one can afford to be without it. Ours this season were inclined to rot, and it was about the only one that had any appearance of doing so. We also have the Rebecca and Diana. The Rebecca we have fruited for six years; it has ripened well every season, and it is one of the very best of our grapes. The Diana ripened well this season, but is not as reliable as any of the others above mentioned.

Our vines are set in a border enclosing about an acre of ground, the border about four feet wide, and before the vines were set out we had the ground trenched from two to three feet deep; vines set about three to four feet apart; some of them allowed to have one and some two canes trained to an upright slat-trellis, with the slats about one foot apart, and from six to ten feet high. We prune upon the spur system, cutting back to one and two buds. In the care of our ground we are very particular, never allowing any weeds to grow, and always keeping the ground light. We use common stable manure, spring and fall, giving the land a good top-dressing, and allow it to remain and drench in through the season.

CAMBRIDGEPORT, 1866.

MANURES.

ESSEX.

Report of the Committee.

The statements which have been submitted to the Committee, and which are appended hereto, relate entirely to artificial manures, and of course confine the attention of the Committee to these fertilizers alone.

The question of the value of all condensed, artificial and strictly chemical fertilizers, is one which has occupied the attention of all who are devoted to modern agriculture. In former days every form of putrescence, all stercoraceous matter, all decomposed vegetable matter, earthy compounds found in natural deposits, were used as manure, and were the means of conducting all experiments, and the subjects of every essay on the principles and processes of fertilization. The distinguished founder of this society, in all his careful investigations, never advanced beyond a consideration of "that precious liquor," as he called it, which flows through the drainage of our stables, or is absorbed by the materials which make up our heaps of composted manure. Since his day we have advanced into the regions of science, and not content with the farmyard, we have called upon chemistry to furnish us with those substances, which, from their portable form, and their specific properties, promise to make fertilization an easy process, and a well-defined and positive art.

The introduction of guano into the list of fertilizers has undoubtedly done much to excite the endeavors of those who would imitate this highly stimulating manure ; and the ingenuity of man has been exhausted in endeavoring to supply the farmer with homeopathic remedies for the diseases and weaknesses of his soil. Phosphates, chlorides, ammonia, nitrogen, all salts and all gases, have been produced in every form, simple and compound, to tempt the farmer away from his manure heap, or to supply the place of such a heap, when its production was an impossibility. That much benefit has been derived from this there can be no doubt. The worn-out lands of some portions of our own country, and the highly cultivated lands of Great Britain, have undoubtedly derived great advantages from guano, bones, the phosphates, and other condensed forms of manures. The precise nature of the benefit of each one of these substances should be carefully investigated by the best experiments. The farmer should be enabled, in some way, to know precisely what he may expect from an investment in the expensive fertilizers so freely offered him—whether it will be of temporary or permanent value, and whether of any value at all.

While your Committee present the recorded experience of some of the best farmers in the county, in the use of some of the condensed fertilizers of the day, they would urge the continuation of these trials upon the remainder of the list. Facts ascertained with regard to bone separated by mechanical process alone, and without any increased solubility by chemical combination, may not be ascertained with regard to guano or the superphosphates. It is important that the subject should be thoroughly investigated—especially when we remember that the good cultivator always returns to a well prepared manure heap, the product of his stable and farmyard, with a confidence which chemistry and the guano islands have not yet shaken.

In conclusion, your Committee would earnestly recommend the continuance of experiments with bones as a fertilizer. Of their value too much cannot be said. When properly introduced into the soil they take the highest rank among fertilizing agents, and have never failed to answer the expectations of the cultivator, *when properly prepared and used.* The dissolving of bones in sulphuric acid has long been known as a most valuable mode of preparing them. More recent experiments with ashes and caustic lime seem to have resulted well. And it remains to be proved how far mechanical solution will take the place of these chemical processes. We most ardently hope that every effort now going on in the county to provide us with bones for manure will be continued and improved upon, until we have a good supply of this manure, prepared in the best manner.

GEO. B. LORING, *Chairman.*

Statement of William R. Putnam, of Danvers.

By the request of the secretary I send the result of a small experiment in the use of bone manure. It was made without any intention of making it public, but simply to satisfy myself which was the best bone manure, made at the different mills in the county.

The soil where the corn was planted is a good loam. It had been in grass for six years. It was ploughed in November, 1865, about seven inches deep. It was well worked with the harrow and cultivator the last of April. The first week in May it was planted; the same kind of seed was used on the whole lot of about two acres.

Lot No. 1 was manured from bone meal from Breed's Mill in Lynn, the cost of which was three cents per pound, and was applied at the rate of 500 pounds per acre. The hills were three and a half feet apart each away; the bone was mixed partially with the soil.

Lot No. 2 was manured with the flour of bone from Walton's Mill in Salem, the cost of which was three cents per pound, and the same quantity applied as in No. 1.

On lot No. 3 I put the same quantity of bone from Day's Mill in West Boxford, costing four cents per pound.

Lot No. 4 was manured with compost manure, at the rate of six cords to the acre, spread on and partly covered with a small plough. I estimated the manure worth $10 per cord when put on.

Lot No. 5 was manured the same as No. 4, with the addition of a small quantity of bone put in the hill; each lot contained 512 hills on about one-ninth of an acre, and the land is nearly level and of uniform quality. It all received the same care and cultivation during the season.

No. 1 produced 11¾ bushels of ears of good sound corn, and 5½ bushels poor corn; total, 17¼ bushels.

No. 2, 10 bushels good, 5½ poor; total, 15½ bushels.

No. 3, 8 bushels good, 6 poor; total, 14 bushels.

No. 4, 17½ bushels good, 2 poor; total 19⅓ bushels.

No. 5, 18½ bushels good, 1¾ poor; total, 20¼ bushels.

From the above it will be seen that the cost of the manure for No. 1 was $15 per acre, and the yield was at the rate of 40 bushels of shelled corn per acre, without the poor corn.

No. 2, cost of manure, $15 per acre, 35 bushels corn.

No. 3, cost of manure, $20 per acre, 28 bushels corn.

No. 4, cost of manure, $70 per acre, 62 bushels corn.

No. 5, cost of manure, $76 per acre, 65 bushels corn.

It will be seen from the above that manure for a bushel of corn cost on No. 1, 37½ cents; No. 2, 40½ cents; No. 3, 67½ cents; No. 4, $1.10; No. 5, $1.10½.

Perhaps I should have stated more particularly the kind of bone used. Mr. Breed's, as he informed me, was the raw bone, crushed in a quartz mill.

Mr. Walton's was made from bones that had been used at the Lowell Print Works, and all the gelatine extracted.

Mr. Day's, had been steamed to extract the gelatine.

Statement of David Choate, of Essex.

Statement of experiments made with bone flour, manufactured by the Boston Milling and Manufacturing Company.

As requested by the trustees at their late meeting, I submit the following statement:—

I received one barrel of the flour of bone, manufactured as above, on the 15th of May last, and on the 19th, and again on the 23d, I applied it to Indian corn, as follows, viz., premising, however, that the whole field had been manured uniformly from the barnyard, the manure having been spread and harrowed in. I took six rows, each 36 hills in length, and upon the first two, which I call Lot No. 1, I applied one-third of a pint to each hill. The corn in all six of the rows was just coming up.

The two middle rows (say No. 2,) had no bone at all. Upon the remaining two rows, No. 3, everything being equal as before, except that it was four days later, I applied one-sixth of a pint to each hill, just half the amount put in the case of No. 1. The quantity applied to No. 1 was at the rate, very nearly, of seventeen bushels per acre of 3,240 hills; and upon No. 3 just half that amount, or more exactly, 8.43 bushels per acre. The mode of cultivation through the season was the same in all six of the rows.

The crop was harvested on the 29th of October. I should have added that no one, whose attention was called to the experiment, could satisfy himself that the bone flour either hastened or retarded the growth or maturity of the crop in any degree whatever. The weight of the corn was as follows:—

In rows,	No. 1, with 17 bushels bone to the acre,	109½ pounds.
	No. 2, with no bone, ...	98¾ "
	No. 3, with 8.43 bush. bone to the acre,	100¼ "

The above result would give, to the acre of 3,240 hills, as follows, viz.:—

No. 1, ...	4,927 pounds.
No. 2, ...	4,443 "
No. 3, ...	4,511 "

What precise amount of shelled corn this weight of ears would give, I have not determined; it was, however, quite unripe, and unfit for shelling or use.

The difference in favor of the bone in the case of No. 1, there being 17 bushels of bone to the acre, is 484 pounds of corn in the ear, more than where *no bone was used*, and 416 pounds more than where *half the quantity* was used.

Suppose 70 pounds of corn in the ear, in the state which I found it in at harvest, to make a bushel of shelled corn, then an acre, using 17 bushels of bone, would produce $6\frac{6}{7}$ bushels of corn *more than where no bone was used;* and an acre with 8.43 bushels of bone would yield $5\frac{6}{7}$ bushels of corn more than where none was used; and what increases the perplexity, 17 bushels of bone to the acre produces only one bushel of corn per acre more than half that quantity does.

Now for the cost. A bushel of bone flour will weigh, I believe, 76 pounds, and 17 bushels at three cents per pound will cost $38.76; so that $6\frac{6}{7}$ bushels of corn will cost *that sum*, viz.: $38.76. For *transportation from Boston*, it will be perceived, I have reckoned nothing, though fifty cents would be, I think, the true expense.

Bone Flour upon English Grass.

One square rod with bone, at the rate of 18 bushels per acre, yielded $69\frac{3}{4}$ pounds of grass cut and immediately weighed, July 9th. The adjoining rod, *without* bone, cut and weighed on the same day, weighed $73\frac{1}{2}$ pounds.

The same experiment was made on lower land, some eight to ten rods distant, and cut July 27th. The rod with bone, as before, yielded 33 pounds; the adjoining rod, without bone, yielded 36 pounds.

The bone had been applied in both these cases, as I think, on the 28th of May, and I selected lots for the experiment where no difference was perceptible in the height or thickness of the grass.

On Barley.

One rod with the bone, 18 bushels to the acre, weighed $20\frac{3}{4}$ pounds; the adjoining rod, with no bone, $30\frac{1}{4}$ pounds.

The barley was ripe, and was cut and weighed, with the straw, on the 26th of July. I find I have lost the date of applying the bone to both the barley and grass, but believe it to have been, as above, on 28th of May.

On Potatoes.

Twenty-five bushels of bone meal were applied to the acre on the 6th of June, being one-half a pint to the hill. I ought to say that in the case of both corn and potatoes the soil was removed from the plant with the hoe, the bone then applied and covered. The potatoes were dug in my absence, and not *weighed* but *measured*—fifteen hills *with bone* yielding three-fourths of a peck more than the adjoining row without. This is equal to forty bushels per acre—the twenty-five bushels of bone costing, however, $57.

On Onions.

Flour of bone was used at the rate of thirty-nine bushels per acre, hoed in by the side of the row just as the onions were breaking ground. These, also, were harvested in my absence, but *as no difference was perceptible*, they were neither measured nor weighed.

On Carrots.

Bone applied, thirty-nine bushels to the acre, and in the same manner as to the onions. The yield was $29\frac{1}{2}$ tons per acre with bone, and $23\frac{1}{5}$ tons without bone. Difference, $6\frac{3}{10}$ tons. At $10 per ton, the produce in the first case, per acre, would be $295; without bone, $232. Cost of 39 bushels of the bone, $88.92; thus the $6\frac{3}{10}$ tons excess, with bone, cost this sum, $88.92.

An answer to all this may be urged, viz., that a *part*, perhaps a *larger part*, of the strength of the bone will be available next year, and perhaps for a still greater length of time. I hope it will prove so; but where I used it last year, I am unable to perceive any manifest traces of it.

On the whole, the *results*, so far as my experience goes at present, are as astounding as they are painful and unaccountable. Last year I was led to think and say the bone had done nobly for *onions*, but I now strongly suspect I was deceived, and attributed an apparent result to a wrong cause.

Were this the time and place for argument, I should urge the importance of an *analysis of the soil*, as well as of the stimulant to be applied to it, lest it should appear that it was as well supplied with a given element as *the prepared manure itself*, and a consequent failure should be inevitable. But the field is as limitless as it is important, and I leave it to abler hands.

Statement of Charles P. Preston, of Danvers.

Having heard from persons whom I supposed to be good authority—that is, those who had experimented with *bone* as a *manure*, that it was a very valuable fertilizer, for corn as well as other crops, and having also the opinion that our soils are generally deficient in *phosphates*, I bought last spring five barrels of bone manure—four of Day's manufacture, and one from the firm of Devereux & Co., Boston.

I applied it, at the rate of 300 pounds per acre, to two acres of corn land, first having spread ten ox-cart loads of good barn manure to the acre on the green sward, and turned it under to the depth of six inches, the bone being applied in the hill, and mixed with the soil as much as practicable.

The corn came well, but—with the exception of some places where manure heaps had formerly been put—it grew generally very slowly indeed, and some hills not at all. The worms destroyed some plants, and other plants, which were not molested by them, seemed to die out for the want of nutriment to keep them alive, so that the vacant hills were quite plenty and were filled by planting white beans.

On a small portion of the field no bone manure was applied, and no appreciable difference marked the crop on this portion. On another part unleached ashes, at the rate of twenty-five bushels per acre, was applied in the hill at the time of planting without bone. Here, I think, nearly double the quantity of corn grew, it having started very well in the spring and continued a good growth through the season. On another small portion, "Gould's Muriate of Lime," at the rate of 600 pounds to the acre, was put in, on which the crop produced was about the same in amount as on the other parts of the field to which an application of bone was made.

In this trial I could perceive no difference between "Day's bone manure" and the "flour of bone" procured in Boston.

I planted another lot of one acre; one-half with corn and the other with potatoes, having ploughed the sward under to the depth of seven inches and spread and harrowed in about four cords of compost per acre. I used Day's bone manure at the rate of 500 pounds per acre in the hill for corn, and in drill for potatoes, leaving a row in each lot in which none was applied. I had a fair crop of corn and potatoes, but could discover no *inferiority* in the crop by measure, from the rows in which *no* bone was applied, as compared with the remainder of the lot.

The result of these trials satisfies me that I *cannot* afford to buy bone manure for these crops; as you will perceive it failed entirely to start the corn earlier and more vigorously than it would have done without its aid, and I failed to discover that it was at all beneficial in promoting its later growth, as it did not seem to make much progress till the roots reached the sward and manure which was turned under, when that which had survived the difficulty of living through the first one or two months without support, started into a vigorous growth and produced a very fair crop, though too late to ripen so *perfectly* as is desirable. I think, judging from that portion of the field to which ashes was applied, that, if applied to the whole, it would have increased the product at least fifteen bushels to the acre.

What benefit the land may derive from the bone hereafter, I cannot, of course, predict; but think I can safely say that farmers, in these times of low prices for produce and high rates for manure and labor, cannot afford to wait *many* years for a favorable result; and very few failing to perceive such result from the application of a costly manure one season, could be induced to apply the same the next.

Statement of Francis P. Putnam.

Last April I purchased 500 pounds of Day's bone meal, for $20, beside freight. I was told it was much cheaper than stable manure, to say nothing of the labor saved in carting. Thought best to try it in different ways to see if it was equal to what Mr. Day and friends recommended. The first piece to which it was applied was sandy loam sward land, ploughed in the fall of 1865; a coat of about five cords of compost manure to the acre spread on the surface and well worked in with harrow and cultivator; then furrowed three and one-half feet apart one way, one gill of bone meal put in the hills; two and one-half feet the other way, and stirred in with the soil on one-half the piece; nothing in the hills on the rest of the piece; the whole was then planted with potatoes on the 8th of May. I could see no benefit at all from the bone in the growing crop, and the yield of potatoes was no more where the meal was used than where it was not. Yield about 180 bushels per acre.

Second piece. The land was similar and adjoining the first; no manure spread; the bone meal put in the hills in nearly the same quantity; the hills about three and one-half feet apart each way. Planted it with corn on the 10th of May; it came up well but failed to grow, except one strip about a rod wide, on which dry wood ashes were spread the spring before. This strip produced pretty fair corn.

Third. Ploughed the ground, on which the grass was mostly killed out, July 25th; harrowed and furrowed, and put compost in all the rows except one—in that put pond muck, mixed with half a bushel of bone meal. The rows were nearly eight rods long. Planted it with round turnips. The produce of the row where the bone meal was put was about the same as the others. I cannot see as yet that I have received the least benefit from the bone meal thus applied.

HEDGES.

MIDDLESEX SOUTH.

Statement of Seth Davis, Esq.

The hedge which I offer for inspection was commenced in 1860 or '61, in the following manner:—

I cut into lengths of about three feet a species of willow known in common parlance as gray willow, being upon an average about three inches in diameter. I set or rather stuck out the same upon a division line about 215 feet in length, on a piece of reclaimed bog-land, principally by drainage, being about four feet deep to hard bottom. The method taken was first with an iron bar to just make an entrance through the surface, and with a beetle drive down the cuttings about sixteen inches deep and about the same distance from each other. That operation was performed by myself and man in about three hours, the cuttings having been previously brought upon the ground. In a few weeks they began to throw out a multitude of shoots, which were permitted to grow through the season. The next spring, after leaving out, they were cut down to within about three feet from the ground, and the same process continued each consecutive spring until June, 1866, (the annual growth being from seven to ten feet high,) when a portion—say about five—of the branches were bent down and placed in a horizontal position, and a continuous rope-like line on one side, commonly termed a wattle by foreigners, was twisted the whole length of the line, being about two and one-half feet high from the ground. Another similar wattle was made about fifteen inches higher than the other, and two others of similar character were made on the other side, which, when completed, appeared at a short distance like four large ropes about fifteen inches perpendicularly and two feet horizontally from each other. All of the remainder of the twigs were clipped off from the sides and above the wattles. The time spent in performing the whole operation, as above described, was less than fifteen hours. The very rapid growth from the wattles and other branches required a second clipping, which was done a few days previously to being examined by your committee. The expense of labor on the aforesaid hedge has not exceeded fifteen hours per annum. It is now a good protection as a fence, and is very generally admired.

The writer, of course, is unable to determine how long it will last; but with proper care he believes it will retain its usefulness as a substitute for a fence, and add to the beauty of rural scenery, for a generation at least. It is probable that the clippings may be of value for wicker-work, as the young branches have from time to time been laid under contribution (without even saying " with your leave,") for that purpose.

The writer has another line of hedge of about twenty rods in length of the same character, commenced last spring, leaving the cuttings, however, but about one foot high, and about the same distance from each other. This kind of hedge would not probably thrive on very dry land ; but on low and even worthless land for cultivation the willow would thrive and well repay the trifling expense of sticking in cuttings. It makes good summer wood, and is valuable as timber for certain uses, being wholly used for artificial limbs. It is also used in other cases where lightness and toughness are requisite.

SETH DAVIS.

WEST NEWTON, September, 1866.

GRAIN CROPS.

WORCESTER NORTH.

From the Report of the Committee.

The Committee cut up a square rod of the corn of each of the competitors on the 28th day of September, husked the same, and found the weight as follows: Luther Page's, 51 pounds; George R. Carter's, 50 pounds; Joseph Goodrich's, $50\frac{5}{16}$ pounds; and Cyrus Kilburn's, $58\frac{1}{4}$ pounds. Edwin D. Works withdrew his field of corn on account of smut. By misapprehension of the time for awarding premiums on corn, one of the Committee shelled Joseph Goodrich's sample, and George R. Carter's, on the 30th of October, and finding his mistake, put the same in bags and kept it till this day, so that the shrinkage was not so much as it would otherwise have been. Luther Page's corn weighed this day, $31\frac{7}{16}$ pounds=$89\frac{46}{56}$ bushels to the acre; shrinkage, $19\frac{9}{16}$ pounds=38.35 per cent. to dry shelled corn. George R. Carter's corn weighed this day, $30\frac{5}{32}$ pounds=$86\frac{9}{56}$ bushels to the acre; shrinkage, 39.68 per cent. Joseph Goodrich's sample weighed, $30\frac{7}{32}$ pounds=$86\frac{19}{56}$ bushels to the acre; shrinkage, 39.93 per cent. Cyrus Kilburn's sample weighed, $29\frac{7}{32}$ pounds=$83\frac{27}{56}$ bushels to the acre; shrinkage, 50.16 per cent. The last lot grew on low black land just above the meadow level, and the cold weather of August, and the early frosts, somewhat injured the crop.

The variety of corn planted on the fields above named was an eight-rowed yellow corn known as the Carter corn, and a variety similar to it. The average shrinkage of the four lots is about 42 per cent. from husking to dry shelled corn, thus requiring about 96 pounds of ears at husking to make one bushel of dry shelled corn. Let future experiments be tried and this amount may be reduced a little.

An experiment was tried a few years ago by one of your Committee, on the King Philip corn, and the shrinkage was 34 per cent., from two years' trial. It has been said that the great corn crop, reported a few years ago in Plymouth County, of 145 bushels to the acre, was calculated from 75 pounds of ears for the bushel of the large, smutty, white corn. It is also said that corn in its *dry* state, contains ten per cent. of water, and that five per cent. of water is frequently expelled by grinding. Let it be remembered that this corn was cut up on the 28th day of September. Later cutting will give less shrinkage.

We might rest here, but the importance of the subject of raising grain forbids. The corn crop is the crop of New England, next to the hay crop, the most indispensable ; it has been conducive to the unparalleled growth of our country. It is both a cereal and forage crop, furnishing an abundance of food for both man and beast, and lies at the foundation of our strength and prosperity. It is indigenous to this continent, and was found among the Indians in the early history of our country.

More bushels of Indian corn are *raised* in the United States annually, than of all other cereals put together. It makes our pork, our beef, our mutton, our poultry ; it gives strength to our horses, our oxen ; it gives us a double crop, of grain and of hay ; is classed by botanists with the grasses, and is used at the South as their principal " fodder " for their horses, mules and cattle ; and the farmer who neglects the cultivation of this important grain here in New England, denies the faith and forfeits his name. It is said that the fodder from an acre producing fifty bushels of corn, will pay for the cultivation after the corn is planted, including the harvesting, which will be at least two tons.

To the young farmer we would say, when you plant corn, plant for fifty bushels to the acre at least ; and when you manure and cultivate as you may, you may expect seventy-five bushels, which are equal to three tons of English hay ; added to the two tons of stover makes five tons. And when you plant, suffer only four blades to grow in a hill ; and graduate your distance of rows and hills according to the variety of corn you plant. Let most of your manure be spread and incorporated with the soil as evenly as possible, so that every itinerant fibre of the root shall find something to elaborate into corn. It is difficult at *earing time* to find a cubic inch of soil without some of these fibres. Cut and stook your corn at the proper season, and you will make a great saving in the value of the fodder, and also in labor. When you cut up your corn, bind and stook as fast as you cut, and your ears of corn will be heavier and sounder than they will if you suffer your corn to wilt and dry before binding and stooking, for in the green state the sap continues to flow some time after the corn is cut. And in the cultivation of your corn crop, keep your field clean of all *weeds*, for beans, turnips and pumpkins, in corn language, are weeds.

WHEAT.—It has been estimated that every person consumes a barrel of flour yearly, and that a town of one thousand inhabitants will consume one thousand barrels of flour, which, at the present prices, will be sixteen thousand dollars for every one thousand inhabitants. If we should have such a tax imposed on us for the support of paupers, schools and other town charges, we might fear an insurrection, or a total breaking down of our finances.

Now what shall be done to obviate this evil? Let us return to the diet of our fathers, to the simplicity of the living of our ancestors, who were blessed with constitutions and strength which some of the men of our degenerate days believe to be fabulous, and the record of which ought to be bound with such books as "Robinson Crusoe" and the "Arabian Nights," or, which perhaps is far better, raise our own wheat on our farms —and it *can* be *done*. Let every *farmer* select an acre or two on his farm for a crop of wheat annually, and either sow winter wheat or spring wheat, according as the land is best adapted. If he will sow winter wheat, let him prepare his land in good season, so that he may sow as early as the first week in September. If he has a field in grass that needs re-seeding, plough it *well*, and harrow in some good compost manure, or other fertilizer, equal to sixteen or twenty loads to the acre; then sow with some clean wheat, free from chess, mullein pink, wheat thief, or any other foul seed, which may be made so by sifting, winnowing or washing. Sow no grass seed with the wheat; the grass, being the hardier of the two, will start first in the spring and damage the wheat. Sow the grass seed early in the spring, as soon as the snow leaves the ground, and it will come up beautifully.

If spring wheat is to be sown, prepare the land and sow as early as possible after the frost leaves the ground and the land becomes dry enough to plough without caking, which advice is applicable to the sowing of barley, oats and spring rye; the earlier sown, the heavier the grain.

White beans, though not grain, having come under the supervision of the Grain Committee, ought to be planted in rows not more than two feet apart, and hills about eighteen inches distant, with a little manure in the hills to give them a quick start, and not more than three plants allowed to stand in a hill; and, as you may see by this Report, a great crop may be harvested from an acre, about fifty bushels, which at three dollars per bushel, is a profitable crop for a small outlay.

If the grain crop is of that importance of which we claim it is, what shall we say of the farmers of Worcester North, when it is announced that only four compete for premiums on Indian corn, four on wheat, two on rye, one on barley, two on oats and two on beans. Must there not be some lack of energy among our farmers, or a lack of inducement held out by our society to bring out the maximum crops which our soil is capable of producing? Would not a premium of twenty-five or even fifty dollars, for the best crop of corn, or wheat, if offered by our society, wake up our farmers?

For the Committee, CYRUS KILBURN.

Statement of Luther Page.

INDIAN CORN.—The land on which my corn was raised was a pasture in 1864. The year following it was planted with corn; a portion of it when used for pasture was very poor, a part of it being a yellow loam with clay bottom and more or less was occupied by lamb-kill, whortleberry bushes, and various other kinds of brush. I broke it up in the fall of 1864, and the following spring set out fruit trees. This year I spread broadcast fifteen loads* of manure from the barn-cellar, and put in the hill a small handful of ashes and plaster; planted by hand, first week in May, with a kind that is called "Fuller corn," seven to eight kernels in a hill. I cultivated one way with the cultivator, and hoed twice; cut stalks 15th of August and commenced harvesting October 1st.

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* An indefinite quantity. In some parts of the State a "load" is understood to be 15 bushels; in others, 22; in others, 25; in others, 33, &c. A cord is about 105 bushels.

Cost of seed and planting,	$3 50
of weeding and hoeing,	7 50
of manure, fifteen loads,	28 50
of harvesting,	9 00
of ploughing and other preparation,	6 25
	$54 75

Statement of George R. Carter.

Indian Corn.—The soil is clayey loam. The crop in 1865 was grass, without using manure, broken up seven inches deep in October, and cross-ploughed first week in May, harrowed and furrowed 20th of that month, and planted the day following with Randall & Jones' corn-planter; one peck of seed used, called the "Carter corn;" cultivated twice with the cultivator one way and once the other way; hand-hoed twice; used twenty-two loads of manure, ten of which were spread and twelve in the hill; cut the stalks September 12th, and gathered the corn October 12th.

Cost of ploughing and other preparation,	$8 00
of seed and planting,	2 00
of cultivating,	6 00
of harvesting and husking,	5 88
Value of manure used,	33 00
	$54 88

Statement of Cyrus Kilburn.

Indian Corn.—The land on which my corn was raised is a sandy loam. In 1864 it was in corn, and in 1865 corn and potatoes. Spread and ploughed in about twenty loads of compost manure, and fifteen loads of like manure were put in the hill with about 150 pounds of superphosphate in the manure. Planted about 15th of May, by hand, with five or six kernels to the hill, of the eight-rowed yellow variety; used a plough cultivator three times, and hand-hoed each time; cut up and stooked about the 16th September; husked the 20th October.

I cut and stook my corn, thereby saving twenty-five per cent. of labor, compared with the old-fashioned way of topping corn, or "cutting stalks," besides saving the stover in a good condition for fodder, my stock eating the whole of it.

Cost of ploughing and ather preparation,	$5 00
of seed and planting,	6 00
of cultivating, &c.,	8 00
of harvesting and husking,	12 00
Value of manure,	40 00
	$71 00

Statement of Cyrus Kilburn.

WHEAT.—The land on which I raised my wheat was loamy with a clayey subsoil. In 1865 the crop was Indian corn, manured with thirty-five loads of compost to the acre; previous to that it was in grass. October 1st of that year it was ploughed seven inches deep. About the fifth of that month, after harrowing the land, I sowed two bushels of blue-stem winter wheat. The latter part of July the crop was harvested, the yield being twenty-two bushels to the acre, and one ton of straw. It was not sowed early enough by a month on account of the extreme drought. When it is well floured it is as good as the best St. Louis flour.

Cost of ploughing and preparing,	$5 00
of seed and sowing,	10 00
of harvesting,	10 00
	$25 00

Statement of Luther Page.

RYE.—The soil on which I raised my rye is a clayey bottom with a black loam. For the two previous years it had grown corn, and was manured with thirty-two loads from my barn cellar. The grain was sowed the last of September with one and a quarter bushels to the acre, after ploughing once six inches deep. The land for the previous nineteen or twenty years had been in grass, and was well grass-bound and dovetailed with witch-grass. Both crops of corn exceeded one hundred bushels to the acre, consuming a large share of the manure applied to the land. The oats were harvested the last of July, and amounted to $32\frac{32}{56}$ bushels, and 3,000 pounds of straw.

Cost of planting and other preparation, ...	$8 25
of seed and sowing, ...	2 20
of harvesting and threshing, ...	8 50
	$18 95

Statement of George R. Carter.

Barley.—The soil on which I raised my barley was a clayey loam, ploughed in the fall and spring, seven inches deep. In 1865 I grew corn on the land, spreading ten loads of green manure and putting twelve loads of compost in the hill. Sowed May 9th after spreading eight loads of manure, with three bushels of two-rowed barley; harvested, $43\frac{3}{4}\frac{4}{8}$ bushels and one-half ton of straw.

Cost of ploughing, ...	$5 00
of manure, ...	12 00
of seed and sowing, ...	4 00
of harvesting, &c., ...	6 90
	$27 90

Statement of Joseph Goodrich.

Oats.—The soil on which I raised my oats was a clayey loam; for the crop ploughed about April 1st, six to eight inches deep. In 1864, it was in grass, in 1865 corn, using about eight cords stable manure. Sowed about the 8th of April with three bushels to the acre; cradled the second week in August; the amount of oats was $52\frac{1}{3}\frac{1}{2}$ bushels; straw, one ton.

Cost of ploughing and other preparation, . .	$4 00
of seed and planting, ...	4 50
of harvesting and threshing, ...	7 00
	$15 50

Statement of Ephraim Graham.

White Beans.—The field where I raised my beans was in a young apple orchard, transplanted in 1862; the surface soil sandy and gravelly, the subsoil somewhat clayey. The field was ploughed quite shallow, and about seven loads of meadow muck, mixed with a small quantity of leached ashes and horse manure, spread and harrowed in. The beans were dropped in drills, about ten quarts to sixty square rods; they were hoed and thinned twice; the product was equal to $48\frac{11}{12}$ bushels to the acre.

Cost of ploughing, planting and seed,	$3 00
of hoeing and thinning,	3 00
of harvesting and threshing,	3 00
Value of manure,	7 00
	$16 00

ROOT CROPS.

WORCESTER NORTH.

From the Report of the Committee.

Onions.—Only one field of onions was entered in due season to compete for the society's premium; and that, by Mr. Lawrin Pratt, South Fitchburg.

The product on the average rod selected weighed $277\frac{1}{2}$ pounds=$4\frac{955}{1000}$ bushels, or $792\frac{4}{5}$ bushels per acre.

The field on which Mr. Pratt grew his onions is alluvial soil on the bank of a branch of the Nashua River; the surface soil is quite sandy or such as has been made from the surrounding hills for centuries, caused by the overflowing of the stream; consequently a great variety of soil.

The crop was a very excellent one; never have we witnessed a field of so even size or better quality; scarcely a root on the whole field was a scullion.

We think Mr. Pratt made a great mistake in the operation of his crop, as the cultivation was by no means clean; but weeds, *weeds*, WEEDS, were allowed to grow as well as onions; we are of the opinion, that had he expended $100 worth of extra labor, "kept down the weeds," he might have had 1,000 bushels instead of 800 which would well have paid the expense, in future crops as well as in the present. Mr. Pratt in this matter perhaps should be excused, as it is well known to one of the members of the Committee, that he has been quite ill for the most part of the season and was obliged to trust his onion bed to such help as he could *get*, not such as he would have *had.*

Sandy Soils.

This kind of soil has generally been considered not worthy of cultivation ; but every farmer well knows the mode that has been adopted for the last fifty years in working light sandy soils. It is simply to plough very light and shallow, and crop with winter rye year after year, or in alternate years, as the soil will hold out, or grow wiry grass for poor sheep to graze upon, and without the application of manure or fertilizers ; and under such cultivation who can expect a good return of any crop from such soils ?

Dr. Dana says: "Of all the soils to be cultivated or to be restored, none are to be preferred to the sandy light soils." It is obvious that light soils may be improved in various ways, and we must be governed by the surrounding circumstances. If they are in the immediate vicinity of a clay pit or fresh meadow, either clay, muck, or both, may be used with good results. The writer of these remarks has experimented with muck upon soils of this character, for the last three years where a young apple orchard has been transplanted, and is satisfied that twenty loads of muck, one load of leached ashes and one load of horse manure are of more value to the trees and hoed crops than the same number of loads of barn manure ; as this treatment serves not only to *make* but very much to *improve* the soil. Another mode of operation is to plough in green crops, such as oats, buckwheat or clover ; as soon as the crop is in blossom turn it in and re-seed, thus ploughing in two crops the same year ; in case the soil has been dressed with muck, this method serves to hasten the work of reclamation.

It is the experience of some practical farmers that the crop be allowed to perfect itself and die where it grew, and turned *in* in a dry state, and the dry crop is of more value than two crops of green. Evidently the dry crop gives more "geine" (earth) than the green; the one acts as a quick consuming fire, the other a slow smouldering ember, giving off gases that serve to feed plants and decompose the sand and quartz. These hard *silicates* in the soil have their part to perform, and it is for the cultivator of the soils to supply them with vegetable matter, such as muck, meadow hay, straw, &c., and their decay causes an evolution of gas that decomposes the *silicates* of potash in the sand; and the potash converts the insoluble into soluble manure, which produces the crop. A word to our young farmers or farmers' boys. Take a few square rods of your light soil, if any you have, and try the experiment as suggested, and we believe that an outlay of $20 on one-eighth of an acre in labor, will in due time produce from 50 to 100 bushels of onions, or its equivalent in some other crop; will you try it?

CABBAGES.—Evidently this crop can be grown on almost any soil where a crop of corn can be cultivated with success. Generally, however, in this section, we get the best return where the surface soil is black loam, approaching muck, and a clay subsoil, or on reclaimed meadow; in case the surface soil is sandy, a compost of muck, night soil and leached ashes will produce a stronger and more remunerative crop than the same amount of barn manure.

The best variety for fall and winter use doubtless is the "Stone Mason"; heads have been grown from plants the present year weighing from twenty to twenty-five pounds, equal in flavor to the "Savoy," and selling in some sections at a higher rate. The 10th of June is the proper time to plant for winter use; if planted earlier they are liable to crack and decay. The best and more successful crops are usually grown by preparing the soil as for a field of corn, manuring in the hill, dropping the seed and covering from one-half an inch to three-fourths in depth, without transplanting.

From the circumstance that such extensive crops have been grown the past year, the growers have been obliged to sell at comparatively low prices, yet "Yankee skill has guessed it out" that we may "have a home market" for the crop. A very extensive milk producer in this section having purchased some ten tons to feed out to cows, says, to quote his own language: "My cows, since feeding with cabbage, have increased their milk from fifteen to twenty per cent." Says another, "My experience is that cabbage produces *flesh*, as well as milk," which facts go to show that we can at any time find ready sale for the crop.

Carrots.—"All vegetation, in various stages of growth, requires warmth, air and moisture to support life and health. Below the surface of the ground there is a body of stagnant water, sometimes to great depth, but in retentive soils usually within a foot or two of the surface. This stagnant water not only excludes the air, but renders the soil much colder, and being in itself of no value, its removal to a greater depth is very desirable." And to accomplish the object, under-draining must be resorted to.

Evidently some soils require more expense than others; a clayey subsoil requires much deeper, and a greater number of drains than in fields where the soil is of a more loamy character; again, we must be governed by the surrounding lands; if the field has the wash of adjacent fields, it is plain that a drain should be constructed to receive the water that flows from the lands above, and cross-drains from the same. The cost of making drains in this neighborhood, from two and one-half to three feet deep, and stoned with common field stone, is about one dollar a rod where the work is done by hand labor alone; but the same amount may be done at much less expense by using oxen and ploughs; three furrows are first cut about six inches deep, and the sod removed; two ploughings more may be made with the same plough, and the earth removed at each ploughing, thus making the excavation about fifteen inches deep; after which the subsoil plough may be used by having a yoke of sufficient length that the team may walk on both sides the drain, and two ploughings more can be made in most of our soils; by this means a great amount of labor is saved in the excavation—at least one-half.

The work of under-draining and the use of the subsoil plough are as yet but little known. Properly draining and removing the stagnant water, renders the soil drier, warmer, and more friable; it leaves the pores and fissures open, thus affording a free circulation of air; and the rains that fall carry the fertilizing substances to the roots of the plants, thus causing a vigorous growth.

How many farmers have noticed—or rather how many have not noticed—low, wet sunken cavities when working these fields, and who has ever noticed in such locations a good crop of any plant cultivated? It is also noticeable that when the field is seeded to grass the cultivated grass roots are soon "worked out" and a poorer quality occupies the place. Now when this water is once removed, those parts of the field produce more abundantly of any crop that may be grown; proving pretty conclusively—on a small scale—the effects of field drainage.

It is also known where deep rooted plants are cultivated on reclaimed meadow, if the water in the ditches stands within six or eight inches of the surface, thus far will the roots extend, but they refuse to go farther, which indicates that the standing water is pernicious to the plant.

The Subsoil Plough.

This farm implement—although not very extensively used—may be considered a co-worker with under-draining; those who have used it, best know its results; it serves to mellow and loosen the soil to almost any desirable depth we choose—at least in very many of our fields.

A member of this Committee having used it the past autumn on his fields, is well satisfied of its good effects. The positive proof of its use, however, is yet to be seen in after crops. Most authors on fruit culture speak of it in high terms—consider it an almost indispensable utensil in preparing the soil for the growth of fruit trees. If so, the rule may follow that it should be in use for many other purposes, especially so for those crops that grow deep in the soil.

Of the carrot crop only two entries were made, one by Mr. Ebenezer Bird, of Leominster, whose field produced at the rate of one thousand bushels per acre, to whom we award the first premium, $4. The other field by Mr. Martin Johnson, of Lunenburg. The product from this field was eight hundred bushels per acre; the root we consider of a superior kind. Mr. Johnson, however, failed to make his return and statement to the Committee at the time appointed, consequently we were obliged to withhold a premium.

Potatoes.—Of this crop five entries were made; two of the same were withdrawn. The product from the field entered by

C. Kilburn, of Lunenburg, was sixty-four and one-third bushels to one-fourth acre, as estimated from the square rod selected; the whole cost of cultivation, seventeen dollars.

The product from Mr. E. Bird's field, of Leominster, was seventy-four and two-thirds bushels; whole cost of cultivation, twenty-two dollars. And that of Mr. H. Harris, of North Ashburnham, one hundred seven and two-thirds bushels; cost of cultivation, forty-five dollars.

As it respects the cultivation of this very useful and profitable root, many experiments have been made and various suggestions offered. The experiment made by a member of the Committee is to seed with whole potatoes instead of cuttings, and the result was a large per cent. above those that were cut—rows standing side by side in the same field. Another member has also tried the experiment—only, however, to a limited extent—by cutting off the "seed end," or the part having the greater number of eyes, and planting the other section—that is, the smooth part—and found these potatoes superior both in quantity and quality, the cultivation being the same. Doubless the best flavored potatoes are grown upon "old pasture land," or lands that have never been cultivated, using a light dressing of plaster. The climate, also, has much to do with the potato crop. Probably the potatoes grown in the north of Ireland are superior in quality to those in any other quarter of the world, while the same crop, cultivated in France and Spain, is very insipid. The northern counties of Scotland, it is said, produce this crop to much greater perfection than in the south of England and Wales. So, also, those grown in Maine, New Hampshire and Vermont are preferred to those cultivated as far south as forty degrees north latitude, or in Massachusetts, even; all of which may be attributed to the different degrees of climate. Hence the location best adapted to this plant is between forty-five and fifty-five degrees north latitude.

In Worcester County the soil that produces the greatest return is on "meadow land reclaimed." We are informed that very extensive fields have been grown in Worcester North the past year on soils of this character, producing at the rate of four hundred bushels per acre. It is pretty generally conceded that this soil does not produce a crop equal in flavor to many others, yet the quantity is much greater.

The cost of reclaiming peat lands varies according to location, usually, however, at about one hundred dollars per acre. Now a farmer that makes it a leading pursuit to supply milk for the market, and is in possession of land of this character that does not pay the interest of ten dollars per acre, what farm work can he pursue to better advantage than reclaim and cultivate a portion of his "old meadow?"

Milch cows fed with this root probably produce a greater quantity of milk than from any other root cultivated.

Having discussed the root crop thus far, the main question may be raised. Which is the more profitable business for a farmer in the north of Worcester County to pursue, to cultivate those perishable articles for the market that he must push off from the farm at a certain time, and suffer a loss of a large per cent., or make it his main object to cultivate such crops as he is not obliged to dispose of when the markets are full?

Probably by cultivating root crops he may have more ready money at hand, and in a series of years be in possession of more bank stock and treasury notes; but that he is in possession of of more or better property than to cultivate such crops as can usually be expended on the farm, and thus improve the same from year to year, your Committee doubt.

In behalf of the Committee, EPHM. GRAHAM.

[The statements on the crops alluded to in the above Report are necessarily omitted for want of definiteness as to the quantities of manure used. A "load" may be an ox-cart, or a horse-cart, or a wheelbarrow full, and nobody can tell what is meant. This indefiniteness is also to be found in the statements made to other societies, and renders them perfectly worthless.]

CRANBERRIES.

ESSEX.

Statement of Gilbert Conant.

The following is a statement of my method and success in the cultivation of the cranberry, for which I make application for a premium. In the summer of 1861, I prepared about an acre of meadow, by cutting a ditch to drain it, and in the fall I ploughed it from four to six inches deep, according to the height of different parts of the meadow. Since then I have flowed it annually about the first of November, and let the water off about the first of May.

The first summer after preparing the meadow as stated, vines sprang up and grew considerably on the lowest parts of it. The second summer the vines increased and grew rapidly. In the fall of that year I gathered about a half bushel of cranberries. In 1864 the vines blossomed full, and after the berries were set, gave promise of a fine crop; but an early frost, while they were quite green, injured them so that I gathered but about a bushel.

In 1865, the vines had increased in some spots on the meadow, so that they had almost killed out the grass, and in the fall, when the berries were ripe, they lay so thick that the vines were scarcely visible. I gathered twenty bushels of cranberries, worth three and a half dollars per bushel. The expense of gathering and marketing these berries was less than ten dollars. This year there are but very few cranberries in this section of country, though my vines are bearing better than I have seen any others on fresh meadow. The crop is not yet gathered, but your Committee can see it on the vines.

The expense of draining this meadow was nothing. The peat taken from the ditch paid the expense. It cost me but $5 to flow it. This was done by a small flood-gate at the bridge. I spread upon the ice in the winter of 1863, two loads of yellow sand, which cost but $2.50, making the whole amount that it has cost me to prepare the meadow, but $7.50. I would here state that the vines on the spot upon which the sand was spread were far more prolific last year than any other vines upon the meadow.

I have had experience in preparing several other pieces of meadow in the same manner, for the cultivation of the cranberry, and in every case have been successful. I neither plant vines nor sow the seed. Whenever any meadow adapted to the cultivation of the cranberry is prepared in the manner that I have prepared mine, vines will spring up and bear spontaneously.

One thing more I will state. This meadow was owned by my grandfather and then by my father, and from him I inherited it—consequently I have known it from my earliest recollection, and I do not think that in all that time a bushel of cranberries has grown upon it before the year 1861, when I first prepared it for the cultivation of the cranberry.

Last year there were but few small spots upon the meadow where the vines were sufficiently matured to produce berries.

STOCK.

HAMPSHIRE, HAMPDEN AND FRANKLIN.

From the Report of the Committee.

One feature of the show was particularly noticeable—the increase of thoroughbred stock. In Shorthorns Messrs. Lathrop and Smith take the lead—Kellogg in the Ayrshires—in Kerrys, Huntington—and of other breeds each one has its advocates. Where such men lead, it must be safe to follow. The question of thoroughbred stock has long been settled, to the untold advantage of the country at large. Compare the cattle we see here to-day with those of twenty-five years ago. Whence comes this improvement but through the thoroughbreds? The time has come when every man who buys a farm will be *very* likely to select his stock from high grades or thoroughbreds. The same is true, not only of cattle, but of sheep and swine. What but careful and judicious breeding has brought the Spanish Merinos of Vermont to their present state of perfection? And judging from the fabulous prices obtained for some of them, it must be very profitable. A ram of the old native stock will bring from five to eight dollars, while one from the flocks of Campbell or Stowell brings from one to ten or even *twenty thousand dollars*. Surely, this must pay. And of swine, it may be said that it costs no more to raise a good breed than a poor one; and farther than this, it may be shown that some breeds will fatten much more rapidly than others with the same feed. Is it not of *some* value to us to *know* and *get* the right ones? Although there has been much improvement in this department of farm stock, there is room for more.

In reviewing the stock on the grounds to-day, we were very much gratified in looking at some of the large cattle. The first, in point of weight, and I might say in quality, were a pair of grade Shorthorns, owned by G. C. Fitch, of Hatfield. They were truly a very likely pair, of 5,500 pounds weight, that will "hold the ball" against any pair in New England. But they were not alone—a second look revealed to "our admiring eyes" three pairs of fat cattle owned by Roswell Hubbard, of the same place, and made us wonder if the owner was going to *stall feed* them more; for, to all appearance, they were stall fed enough, if fat is any indication of feed. Their weight is from 4,500 to 5,000 pounds. While Hatfield bore the palm in size, Westfield was not far behind in quality. The string of seven pairs, belonging to Charles Fowler, were altogether a very superior lot of cattle—particularly one pair of four years old steers—judged to weigh 4,200 pounds. Major George and Hezekiah Taylor also presented two very good pairs.

Of working oxen the show was excellent. We never saw better matched or better trained, or a more likely lot of *workers* together.

In the class of four years old were five or six pairs weighing from 3,500 to 3,800, that would defy competition in any show held in this section—not excepting the New England and Vermont State Fair at Brattleborough. Most—perhaps all of them —were high grade Shorthorns or Herefords.

Of bulls the show was not as large as we have seen; but what was lacking in numbers was made up in quality. Among them was a thoroughbred, belonging to Paoli Lathrop, that stood No. 1. He was truly a very fine animal. Also one belonging to M. J. Smith & Son, ten months old, said to be from the best stock in the United States. He was in all points a *perfect* animal—one that the owner may feel proud of.

There was a fair show of milch cows, though not so good as on some former occasions. Among them were some superior ones, not only for their milking qualities, but for the improvement of stock—a qualification which should not be overlooked. In selecting a cow to be kept on the farm, regard should be had to *blood*, *constitution and symmetry of form*, as well as her milking qualities. One point in a cow which is seldom thought of, is what butchers call a good handler—one whose skin is soft and thin, like a kid glove. Such an one will always put on flesh rapidly when no longer useful for milk, and will transmit to her offspring the same good qualities. Show me a cow that is a good handler, and I will tell you what her progeny will be. If I wanted to raise a nice pair of steers, I should be very sure not to have her calves deaconed.

There were four competitors for herd premiums. That of Paoli Lathrop, of South Hadley Falls, consisting of twelve head, all Shorthorns, of superior excellence. They need no comment of ours, for they stand at the head of thoroughbred stock in this region.

M. J. Smith & Son were there with fourteen head, all very good, most or all of them thoroughbred Durhams.

M. D. Kellogg with his Ayrshires—in all eighteen head. They were choice stock, and the owner may well feel proud of them. They were mostly cows and heifers, and will compare very favorably with any other stock on the ground.

In behalf of the Committee, H. S. PORTER.

NANTUCKET.

From the Report of the Committee.

What stock was examined was of the Jersey breed, and came from animals brought here by James Thompson, Esq., and we are free to say, after examining much other Jersey stock at the fairs of other counties, that there is none in the country that boasts a better pedigree than this which has laid a foundation in Nantucket for future sale abroad.

This island of Nantucket is most favorably situated for preserving any pure breed of stock. No mongrel cow can be brought here privately. The only communication with the continent is by steam or packet, and these are compelled to land within a few rods, and under circumstances that will defy the introduction of animals unknown to the public. About the time that the Jerseys were imported here, a fine lot of Ayrshires were also brought; but upon consideration, it was deemed advisable to devote our attention to the rearing of one kind alone; and as the view of the farmers in the neighboring island of Martha's Vineyard agreed with ours, and as they preferred the Ayrshires, what few of that breed we had were disposed of, and only the Jerseys retained. As the Ayrshires of the Vineyard are of the very best stock of that kind, and our Jerseys rank first in the country, the stock raisers of these two islands are determined to have animals so pure in breed that farmers of the New England States can, after a lapse of a few years, supply themselves with a breed of cows, known to be untainted, and of a parentage that will defy competition.

The first Jerseys that were brought to Nantucket, and from which our present herd has mostly descended, were from imported cows, selected by Peter Lawson, Esq., of Lowell, in Europe, in 1851. Mr. Lawson retained one, which had a male calf soon after her arrival, and sold the other to his neighbor, E. M. Read, Esq. His own cow he called "Victoria," and her bull calf he named "Wellington." Mr. Read called his cow "Europa," and her heifer calf, the first she had, "Mountain Maid." "Mountain Maid" had a heifer calf called "Nellie," and "Nellie" was the mother of "Wellington the 2d," which was the bull brought here by Mr. Thompson, in 1864. So that this animal was a direct and thoroughbred descendant of Mr. Read's imported cow "Europa." Thus much for one of the bulls that is now owned in Nantucket.

The cow owned by F. C. Sanford, Esq., and brought here by Mr. Thompson, is called "Beauty." At her last calving this cow gave seventeen quarts of milk a day. This cow is a granddaughter of Mr. Lawson's imported "Victoria" by one of Mr. Read's bulls, who, you will remember, purchased the other cow that Lawson imported.

Some might object that the Nantucket stock would deteriorate, as the progeny will be so near akin to each other. But this has been remedied, and in the best way. Mr. William R. Easton's "Princess" is from "Duchess," a cow imported by David Dana, Esq., of Lowell, and of a stock equally good with the cows of Mr. Lawson, but of an entire distinct relationship, and one of the male descendants of "Duchess," is now here and is used to break up the near relationship of the descendants of either "Victoria" or "Europa," who, by the way, were not related, except perhaps very distantly. That the breeds of these two cows do not deteriorate is shown by "Jenny Lind," a cow owned by Mr. Thompson, which was sired by Lawson's bull, "Wellington," and her dam imported "Europa." This cow gave 3,134 quarts of milk in ten months. But among the many excellent cows of this kind, perhaps the most remarkable is "Primrose." This cow is now giving from fifteen to seventeen quarts of the very richest milk, and what is perhaps unheard of in other breeds of cows, the cream from "Primrose" measured one and one-fourth inches on a column of milk five inches high. In this connection we can only say to the farmers abroad, that when the time comes that it will be judicious to sell any of this breed of cows away from the county, it will be for their interest, if they seek purity of stock, to purchase it at Nantucket. The stock here is recognized in the Jersey "herd book," and every calf born has its exact pedigree stated.

As to the Jersey cow in general. The various owners of this kind of stock in this county agree that the Jersey cow is as rugged, and can stand exposure, as well as any of our natives. Some of them go farther, and say, that, while they are no more hearty, and are fed on precisely the same food as the natives, and subject to the same exposure, they do not suffer so much. As the proof of this, while the native cow will give a smaller mess after a day of exposure than at other times, the Jersey, according to their united testimony, under the same circumstances, will yield her full quantity.

We must, therefore, urge upon our farmers to procure, as quick as possible, thoroughbred stock. If they cannot get the pure until there are more animals reared, then cross their natives as soon as they can with what are known to be pure. Don't be deceived with a mongrel, or, for the saving of fifty cents or a dollar, get a calf, which, if you intend to rear it, will, in five cases out of six, be comparatively worthless, or if you slaughter it, will bring you from the butcher but seven or eight dollars, while your neighbor's "grades" will be readily purchased at from ten to fifteen. Such is not economy. It is in reality saving at the spile and losing at the bung. We must remember that straws show which way the wind blows. Since the formation of the agricultural society in this county, there has been a general attempt to improve the stock of cows; and although in most instances by selecting the best native stock, and breeding from that, yet the average yield of the herds here has been raised from three quarts of milk daily to five—nearly double. What would this average have been had nothing but pure Ayrshires or Jerseys or Herefords been used? Our farmers should ponder these things. There is money in intelligent, scientific farming. In the old, plodding, father-did-so-before-me kind, there is nothing but labor and poverty. No man of ordinary means is rich enough to keep poor stock. Four cows that average eight quarts of milk eat but just half as much as eight cows which average but four quarts. The twelve tons of hay that the four poor ones eat, is worth, in ordinary times, nearly two hundred dollars. About all wasted. The extra manure will hardly pay for the extra labor. We wish to bring these matters close to the minds of our farmers, that they may reap a rich harvest where now they are struggling against anticipated poverty. The princely farmers of Pennsylvania, and of the Genesee and Connecticut Valleys, and of the West, never despise book farming or pure stock. Their cows are Shorthorns, or Ayrshires, or Devons, or some other pure breed. Their sheep are Saxonies, or Leicesters, or Southdowns, or something that is clean of its kind ; and so with their fowls, and their turkeys and pigs, and everything else. Farmers, let us be thus wise, and, verily, we shall have our reward !

Before closing our Report, we desire to state that there are now five males of the best Alderney breed within the reach of our farmers.

1. " Abe Lincoln." This bull is kept by Mr. James Thompson. His mother was " Jenny Lind," and his sire " Dick Swiveller, Jr.," whose father was from Mr. Motley's cow " Flora," that yielded 512 pounds of butter in a year. This was " Dick Swiveller, Sr.," the grandfather of "Abe." His mother was one of J. S. Eldredge's best imported cows.

2. " Gen. Burnside." This bull was imported this year by Mr. Thompson. His grand-dam was an imported cow of pure Alderney stock, and which gave twenty-one quarts of milk, *beer measure*. His sire was " Sultan," of Mr. Motley's stock, and his grandfather was the sire of " Dick Swiveller," or Motley's " Major." This bull is kept by Mr. Thompson.

3. " McClellan." This animal came from William R. Easton's " Princess," and was sired by " Dick Swiveller, Jr." This bull is owned by Joseph Vincent.

4. There is also a thoroughbred bull at Sylvanus Morey's, called " Islander." This animal came from " Beauty," and was sired by " Wellington, 2d," which, as you see, runs directly back to the Peter Lawson, Read and Motley stock.

5. " Nimrod." Owned by Mr. Thompson. Dam is " Jenny Lind," and his sire " Wellington, 2d." So that we now have

two of the "Wellington, 2d," two of the "Dick Swiveller," and one of the "Sultan" breed.

The Committee award the first premium to F. C. Sanford, Esq., for his single cow "Beauty." The second premium for single cow to James Thompson, Esq., for his cow "Primrose." The first premium for yearling and calf to James Thompson; and the first premium for herd of not less than five thoroughbreds to James Thompson.

EDWARD M. GARDNER, *Chairman.*

MILCH COWS.

HAMPSHIRE, HAMPDEN AND FRANKLIN.

From the Report of the Committee.

The ancient Egyptians worshipped a bull. Their pupils in theology, the Israelites, on a certain occasion, in the absence of a bull of the requisite characteristics, worshipped a golden calf. If men must pay their devotions to a brute, one would think a good family cow far more worthy of the tribute. The bull was worshipped as a symbol of productiveness. But what signifies mere propagation without nurture? The cow not only produces, but rears her young. Not only that, but she helps to rear the young of human kind. She gives us veal, milk, butter and cheese, and then at last surrenders her own body for beef, which, to say the least, is not inferior to bull-beef. Into how many dishes for the nutrition or gratification of man, milk and butter enter as constituent elements, it would be difficult to enumerate. Even the porter-house steak from the stall-fed ox does not satisfy the epicure, till a contribution from the cow has heightened its flavor. High scientific authority has declared that one pound of cheese is equivalent in the way of nutrition, to two pounds of beef, and an experiment made in France a few years ago served to show that the production of three pounds of cheese cost no more than one of beef. However this may be, it is beyond dispute, that no other domestic animal is productive of such varied utility to man. Hence, with regard to no other, should there be greater care and painstaking in selecting and developing. Some animals are called cows which are hardly entitled to the name. Webster defines a cow, "a female of the bovine genus of animals * * * whose *milk furnishes an abundance of food and profit to the farmer.*" Judged by this standard, cows are comparatively scarce. A "female bovine" that has had a calf, is not necessarily a cow. An animal that has so small a development of udder that a close inspection is necessary to distinguish the sex, is not a cow. Yet multitudes of just such animals are supposed to be cows, and are kept as such. Many a farmer wastes his substance in feeding half a dozen such brutes the year around, and gets no more return than he might derive from two genuine cows. Apathy on this subject is due not only to traditionary usage, but to a prejudice against what are called "new fangled notions," and "fancy farming." It is true that some money has been foolishly spent in this direction. It is true that some cows bearing large names and pretentious pedigrees, have been absurdly overvalued. But it is just as true that a really good cow is cheaper at a seemingly high price, than an ordinary cow at a common price. We will suppose the former to cost $120, and the latter just one-third as much, $40. Here is a difference of $80, which, at first sight, looks disproportionate and extravagant. But after purchase, the one cow needs no more barn room, no more feed, and no better care than the other. The interest on $80 for one year, at six per cent., is $4.80. How long will it take the superior cow to pay this difference, the *only difference*, be it remembered, *in a year's outlay* on the respective animals. We will suppose the best cow to average eighteen quarts of milk per day for ninety days after calving, and the other cow to average ten quarts per day during the same period. Here is a difference of eight quarts per day, which at eight cents per quart, makes a difference of sixty-four cents per day: $4.80 divided by sixty-four cents gives seven and one-half days—say one week—as the time required to pay this interest. During this very week, be it remembered, she gives, besides, as much milk as the other cow, and during the other fifty-one weeks of the year; all her excess of yield above that of the other cow, is clear gain as compared with that cow. Let us extend our calculation over the whole period of ninety days. By the supposition, the superior cow gives eighteen quarts per day, and during the whole period, 1,620 quarts. At eight cents per quart, the amount is $129.60. The other cow during the same time produces 900 quarts, worth $72. Here is a difference of $57.60, in one-third of a year. Suppose the best cow to average but sixteen quarts per day, and the other cow to average twelve quarts. The difference will still be $28.80 during one-third of a year, just six times the interest on the increased cost of the better cow, for the whole year. The fact that the genuine cow will yield milk till she calves again, while the indifferent cow will fail two or three months, makes the contrast between them still more glaring. It should be remembered, too, that the indifferent cow *may* cost in keeping, during the whole year, all that her milk will bring, leaving the interest on the original $40, and the labor expended, a dead loss, for her manure is worth no more than that of a good cow. It should be remembered, also, that whatever the price of milk, the *relative* difference in the receipts from the two cows remains the same.

It follows, then, that whenever an ordinary cow will simply pay for keeping, a superior one will yield a handsome profit. If those farmers, of whom it is hoped the number is small, who are contented to jog on as their fathers did before them, and who go through the form of milking half a dozen hermaphrodites every day, would consign them all to the shambles, and substitute therefor three genuine cows, they would soon get new ideas of the profits of the dairy and the beauties of farming.

But can good cows enough be obtained to supply the place of all the poor ones? Probably not at once. It must be done by degrees. We would say, let every cow, of known and decided inferiority for dairy purposes, be at once converted into beef. She does not render an equivalent, either to her owner or the world at large, "for value received." With every cow of questionable worth for the dairy, let such an uncompromising book account be kept during three such months in the year as will best test her character, and on the result let her fate depend. A process of this kind, generally practised, would bring out surprising results, and would so stimulate the production, development and importation of superior cows, that the supply would soon equal the demand. But the book account—herein lies the trouble. It requires time, painstaking and patience. Most farmers will not submit to it in any department of their business. Hence the variety and contrariety of opinion among them about the simplest matters of their vocation. Hence there is so much groping in the dark. But real progress is attainable in no other way than by accurate accounts. Facts and figures, not vague impressions, are the basis of all real knowledge. The merchant or manufacturer who should go on year after year without knowing what was profitable and what not, would come to grief. Singular shortcomings in this respect were developed at our recent fair. Notwithstanding the published requisitions of the society, of ten cows entered for a premium, only five were accompanied with any " written statement," and only one of these statements approximated at all to the character required. The others, though not devoid of interest, were nearly useless for the purposes of comparison. Respecting one cow, no information, oral or written, could be obtained. The cow, however, spoke for herself so well, that a gratuity of $3 to her owner was recommended. The Committee would suggest that, hereafter, a strict compliance with the published regulations of the society should be enforced, and particularly that milk should be computed by weight and not by measure.

L. J. Dudley, *Chairman.*

WORKING OXEN.

WORCESTER NORTH.

From the Report of the Committee on Steers.

If any spectator had doubted the practicability of ox-training, or the wisdom of appropriating a part of the society's funds to stimulate efforts towards a higher standard, this year's exhibition of working cattle was well calculated to remove those doubts, and to elicit approval.

Of the several trials of working steers, it is but just to say that the several pairs appeared to fairly represent the character and degree of their training ; but at the same time your Committee cannot refrain from expressing regret that the performance of the pairs belonging to J. P. Reed was so much superior to that which received the second premium, that the making a just award was an easy matter. As your Committee define their province, awards in this class have very little reference to points which would be regarded if the cattle were entered only as standing stock ; yet as really superior training is so largely dependent on good matching and symmetrical build, we take pleasure in citing as an illustration the before-mentioned steers of J. P. Reed.

Lest our awards and report should fall under the suspicion of flowing from the tastes and predilections of "fancy men" and "gentlemen farmers," (in view of some fanciful feats which our friend Reed's steers were made to exhibit, subsequent to their legitimate trials,) we would state that our decisions were made up without reference to such exploits, as we were in duty bound.

Indeed, it is on purely utilitarian grounds that we award the highest premium and praise to the kind and degree of training exhibited in these cattle. It is not so much mere capacity for draught, as an educated nimbleness in performing light work, that farmers in general require.

The peculiar use and advantage of this quality is often experienced in jobs where much turning, halting, backing, &c., is required ; as pulling stones, stumps and the like, from the ground, and hauling logs together in the woods.

In winter work the constant liability to injury, which all working cattle are more or less under, is also reduced nearly to the point of safety. When we reflect how generally cattle in these employments are grossly abused, it seems hardly possible to overestimate the value of those habits which tend to avert, if they do not actually insure them against the accidents which impend, and the abuses of teamstership which befall.

How have our hearts bled with pity, and alternately burned with indignation and shame, at the sight of those sad wrecks of once noble structures of meat, muscle and bone ; while reflecting how great a proportion of the lost strength was a wasteful expenditure, incident to their lack of training, their awkwardness, and the cruelties thereby entailed.

By the rules of the society, all persons are excluded from competition as teamsters, except those under age ; and your Committee felt somewhat embarrassed in the performance of their duties as arbiters in the matter of teamstership, from the fact that while they did not feel bound by any law of the society to award an undeserved premium, they *did* feel bound to act in reference to the apparently indifferent standard created and recognized by preceding Committees.

It is hoped, therefore, that competitors, and all others concerned, will, by these qualifying remarks, be able to discern the standard which your Committee recognize and feel bound to uphold.

The good teamster must have an apprehensive mind, a clearly defined purpose, and a strong will. Cattle that have been educated under the influence of these qualities can be relied on to put forth their utmost strength, from a habit of voluntary obedience—without the stimulation of whip, or any noisy demonstration. No being, human or quadruped, can do its best under stress of violence—it precludes confidence and courage, which are the truest guarantees of the highest endeavor in man or beast.

Who knows but a glimmering belief that he *can do* a thing, must, even in the animal, precede the actual exploit ?

In the exercise of backing there was, with a single exception, a failure to run the load back rapidly and straight, which we attributed chiefly to a single cause, viz. : the driver's standing too near the cattle's heads, forward, and rather *scaring* them back by a fussy, impetuous manner, and vigorous whipping, than setting them the example by *backing himself.* We never saw a pair so managed but would make unequal exertions in spite of the anxious driver, and *wing out* so as to thwart his earnest purpose. Common men, crossed in their expectations under such circumstances, are not likely to complacently " accept the situation," and are extremely liable, under the mortification of failure, to involve themselves in a complication of difficulties, for which, in justice, they have only themselves to blame. Failure to comprehend the " *modus operandi* " of driving is the defect of the common run of teamsters. Whoever clearly comprehends *what he wishes his team to do*—the *how* of doing it—is usually possessed of tact and force to realize its execution. We are often led to believe that teamsters, like poets, are " born, not made ; " and yet teamstership is an art which can be acquired wherever there is that passionate devotion which makes adepts in other arts. Such devotion we verily believe its importance demands. For the information of any who may be in doubt, we would say that of the two pairs of working steers entered as W. E. Beaman's, the third premium was awarded to the pair whose trial came off first.

In view of the annoyance we experienced, in consideration of the greater duties devolving upon committees on this class of stock, your Committee beg leave to suggest the propriety of allowing the trial of working steers to precede that of working oxen, in future exhibitions. We also respectfully suggest that the society create an office like that of sergeant-at-arms, and fill it with a committee empowered to compel attendance from owners of stock.

While wearily traversing up and down the line of "two-year-olds"—those seemingly immobile masses of youthful beef on legs, negligently tethered to the Common-fence—with anxious intent to do full justice to *absent competitors*, your Committee could not but wish that they had been on the ground to show that the said youthful beeves were not merely reluctantly and awkwardly standing two by two, for the occasion, but were capable of activities which might help to decide the question of degrees of merit—below the superlative. Of the eight pairs whose owners' names appeared under this class in the entry book, your Committee succeeded in finding but *seven*, until a few moments before retiring. The missing pair was found in one of the pens; but unhappily (?) was not of a character to necessitate an alteration of the verdict which your Committee had pronounced on the others.

Respectfully submitted in behalf of the Committee,

A. B. Davis, *Chairman.*

WORCESTER.

From the Report of the Committee.

There is no one thing at an agricultural fair that excites more interest with the farmers than the trial of working oxen upon the plough as well as the cart. There is a spirit of emulation not found in any other department, or at least not manifest, and there is no one thing so indispensable to the farmer as the ox. In the cultivation of the rugged soil and rocky hills of New England the ox is the motive power—the most sure and reliable. The ox is one of the indispensable institutions of American society, and he is not to be neglected or overlooked ; he, as the connecting link between the present and the past, deserves our respect, as a discipline is, to a farmer boy, at least a subject of remembrance.

Your Committee are of opinion that no motive power can be applied to the cultivation of the farm, where pecuniary profit is concerned, that will pay as well as the ox. From the time he commences his labors, (say three years old,) he more than pays his living, and is increasing in value for work and for beef. He performs all the requirements upon the farm, and in five or six years he will double and many times treble in value.

Horse power in many places has been introduced upon the farm, but is found a poor tool unless the soil has first been ploughed and renovated by the patient, sure toil of the ox. The majestic form of the ox, as he guides the cart and moves the plough over the rocky fields of Worcester County hills, we admire.

Form, energy and color indicate the character of the animal. Form is first in importance, energy the second, color third.

The eye is a peculiar organ, is very sensitive, and likes to be pleased. You please the eye, and you advance a long stride towards pleasing the other senses ; therefore, a well-formed and nicely matched pair of oxen, all other things being equal, will command a much higher price than those that do not meet the eye as well, and the owner feels much more satisfaction in exhibiting them.

Color, and shape of the horns, have much to do in regard to the sale of an ox. The horns and color are prominent features, and always strike the eye with favor or disgust, and should be made a subject of much care in matching oxen. Always have them as near similar as possible, and with the *energy* combined with the qualities spoken of above, a farmer will always find purchasers at remunerating prices, and the satisfaction of blessing the community with a nice pair of oxen.

Your Committee have had the pleasure of examining eighteen pairs of oxen, as beautiful, nice and well matched cattle as heart or imagination could desire or eye delight to see. All were worthy and merited a premium.

Sixteen pairs contested for the premiums—two pairs were for exhibition only.

The work was all done with comparatively no noise, and without the use of the whip. But there was one solitary instance where the unmerciful use of the whip was manifest. One beautiful, intelligent young ox came on the ground with one side nearly covered with stripes, from six to twenty-four inches long, and raised nearly as large as a man's finger. Your Committee spoke of the disgusting and uncomely appearance of such treatment. The driver informed them that it was done at the trial upon the plough, which was but a poor and insufficient excuse for such unmerciful treatment.

Your Committee would recommend to all owners or drivers of oxen, if it is absolutely necessary, (which your Committee very much doubt,) to use the whip to such an unmerciful extent, to do it at home some weeks previous to an exhibition of this kind, and thereby help their own reputation, and not disgust and wound the better feelings of the community. A word to the wise is sufficient, and your Committee hope and trust they may never have occasion to meet any other case of the kind. Respectfully submitted.

C. P. Rice, *for the Committee.*

HORSES.

MIDDLESEX NORTH.

From the Report of the Committee.

Quite a number of the animals presented for examination to your Committee were found unsound, of poor form, and very inferior character. To remedy this in the future, let it be distinctly understood that it is useless to offer for premiums any worn out, unsound or inferior animals, and encourage, by offering the highest premiums the society can afford, the breeding of the best animals of all kinds, but more especially horses.

What a pleasure it must be to those who raise horses, after having sold them, to see them in good hands, where they are kindly treated. On the contrary, how sad and touching to our feelings is the sight of some poor animal, that we had raised or owned and perhaps learned to love, suffering from lameness, or perhaps blind, and in the hands of some unfeeling wretch, who cares for nothing but the amount of labor he can obtain from such a horse, and when the poor unfortunate animal is sick and weary, is ever ready to apply with cruel force the lash.

I say, also, let us do all we can to avoid the production of constitutional diseases in our animals. The world cannot learn to love and care kindly for such, as it does for those of fine form, good quality and perfect organism. That which lies at the foundation of the improvement of every stock, or the successful management of it, is the fact—the common but too much neglected maxim—that "like produces like." This is the governing law in every portion of animated nature; there is not a deviation from it in the vegetable world.

In the breeding of our domestic animals, how important it is to avoid the transmission of constitutional diseases. A want of due attention in the breeding and rearing of animals by the farmer, has been attended by more disappointment than any other cause.

How obvious is the necessity, then, of selecting breeding animals, as far as human skill can discover, free from every taint capable of propagation. Even in this enlightened age, much too little attention is given to this most essential subject. It is admitted by human, as well as veterinary pathologists, that disease, temperament, internal and external defect in organization, can be inherited from both parents by their offspring.

This physiological fact is not heeded during the warmth of youth by the human family, and it is only in the decline of life that, upon mature reflection, the truth appears, and at a time when the sad effects have been made manifest, and cannot be remedied. That the same order of nature pervades the whole animal kingdom, I need not dwell on, for it is proved to a demonstration by every yearly progress of our lives; also, that if we disobey the organic laws of creation, we must pay the penalty in this life, individually, or in succession.

The care and management that is now bestowed upon the lower animals by the *connoisseur* in stock-breeding, and the high price that is paid for size, style, color and speed of our best breeds of horses, ought to induce our farming community to give some attention to the general physiology of animals. The cost of raising a horse of good quality is but little more than that of raising one of inferior quality; the value of the former at maturity is from three to six hundred, or it may be, thousands of dollars, while the value of the latter is hardly enough to pay for the food he has eaten.

ROBERT WOOD, *Chairman.*

HAMPSHIRE, HAMPDEN AND FRANKLIN.

From the Report of the Committee.

The horses were out in sufficient numbers to form a cavalcade extending completely around the half-mile track, and to render any very critical examination of them an absolute impossibility. This however was of little consequence, because nearly every one was imported from Vermont or Canada, and bred nobody cared how. The main inquiries respecting each competitor for a premium related not so much to pedigree or history, color or form, as to strength or speed, which were readily determined by actual trial. The variety was as great as the number of entries, and the mixture of breeds, if any of them deserve the name, was wonderful. There were in some of the competitors unmistakable traces of the high-stepping, lop-eared, lazy, but tough Canadian stock, though not one genuine specimen. This race has undoubtedly descended—in more senses than one—from the famous Norman horse of France. The Massachusetts Society for Promoting Agriculture has recently imported two fine stallions of this breed, which are kept at Jamaica Plain, for the improvement of our stock of work horses.

There were at the show Morgan horses of almost every variety from the genteel, swift-footed Black Hawk, to the compact and spirited descendants of Green Mountain. Messenger and Hambletonian stock, so-called, was not difficult to find, but as usual the precise pedigree was an unknown quantity. It is perhaps worthy of remark that while the descendants of Messenger have always been celebrated as excellent roadsters, they now stand unrivalled for speed on the trotting course, the fastest time on record being that of Dexter, who trotted a mile, on the Fashion Course, Long Island, October 10, 1866, in two minutes and eighteen and one-fifth seconds. He was sired by Rysdick's Hambletonian, and raised by J. Hawkins, Montgomery, Orange County, New York.

From the general character of the animals exhibited, it was evident that the members of the society do not give much attention to the raising of horses for any purpose. There were but few colts entered for premiums, and the show of stallions was very meagre. The farmers of the river towns obviously find it more profitable to devote their attention to the production of staple crops than to horse-breeding, and they doubtless act with the highest economy in importing the great number of animals required for the various mechanical operations of modern agriculture. The tendency in farming, as in all other business, is towards a greater division of labor and a more thorough concentration of effort upon specialties. If then, horse-breeding is not to be particularly encouraged by your society, what should be the objects of a horse-show and how may they be best attained?

In the first place, it is apparent from the number of visitors in attendance that the beauty of fine horses, the speed of fast ones, and the strength and docility of well-trained working teams, are among the most efficient means of attracting, interesting and amusing the masses of the people; and it is certainly the duty of the managers of our agricultural holidays to render them as enjoyable as is possible within the limits of sobriety and Christian morals. We Americans do not have recreation enough for our best welfare; we labor too unremittingly, and are often unduly stimulated by the desire of doing or acquiring some immediate good. If we could more frequently lose ourselves in a crowd and have our feelings excited and elicited by something other than our accustomed tasks, we should be healthier, fresher, happier, more useful and more successful in the accomplishment of life's work. But our fairs ought to be instructive as well as entertaining, and the following suggestions are therefore offered, respecting the management of some matters pertaining to them, with special reference, however, to the show at Northampton.

First. For obvious reasons, tents, peddlers, and side shows should be entirely excluded from the ground inside the track, and especially from the immediate vicinity of the main entrance. If the society have not land enough to accommodate them outside the track, an acre or two more should be purchased for this purpose, and there would be no objection to having it in a square form, fenced on three sides, and opening into the present enclosure.

Second. Each division of horses should be brought promptly at the appointed time to the judges' stand, and so far as practicable, examined and tried there. It would also add to the interest of the exhibition, if the chairman of each committee were provided with ribbons of various colors, to be attached to the premium horses, as soon as a decision is made. In order that the track be cleared and the several classes be examined at the time specified, the chief marshal should have the entire control of the exhibition, and act with much promptness and energy.

Third. All horses entered for premiums should be properly located on the ground according to their respective classes, and when not under examination by the committee, should be in their places throughout the day, or, at least, until the hour for dinner.

Fourth. All horses in the division called family horses should be regarded as single carriage horses, and should not be driven for trial at a speed exceeding a mile in four minutes. They should be estimated rather by their size, style and docility than by their speed.

Fifth. The division of travelling horses might, with equal propriety, be named roadsters, or gentlemen's driving horses, and should include all horses which, whether single or in pairs, are driven for exhibition at a rate exceeding a mile in four minutes. In order that their real merit as roadsters be distinctly proved, they should be driven, not in sulkies or skeleton wagons, but in such vehicles as are ordinarily used on the road, and should go for trial two and a half miles in ten minutes or less.

Sixth. Premiums should be offered for the fastest walking, both by single horses and by pairs. The real value of the horse for any business is greatly enhanced by the ability to walk rapidly, and as this pace may be much improved by careful training, the exhibition of the best and fastest walkers would be both pleasing and instructive.

Finally, premiums should be given for the best trained or most highly educated horses—those that can perform the most surprising feats, or can be best managed by the voice only, or manifest the least fear of guns, drums, papers, umbrellas and other startling objects. The exhibition of such horses is always entertaining and useful, as illustrating the remarkable intelligence and docility of the noblest domestic animal. Information on the subject of educating the horse may be found in the Massachusetts Report on Agriculture, for 1860.

On the whole, the horse-show at Northampton, October 5, 1866, was a decided success, and as creditable to the officers of the society as it was delightful and profitable to the visitors.

Respectfully submitted. W. S. CLARK, *Reporter.*

SHEEP.

MIDDLESEX.

From the Report of the Committee.

Wool is now hardly to be reckoned among the products of Middlesex County. The small amount produced is fairly indicated by the slim display of sheep at the fair. Only three were exhibited, besides those shown by Mr. Chenery. It may be about time for the farmers to look into this matter. A new branch of manufactures has recently been introduced into this country, creating a large home demand for combing wool. The worsted stuffs, so largely made in Leeds and Bradford, England, are now being successfully produced here in large variety, and to a considerable extent. Strictly combing wool, suitable for this new business, has not thus far been raised in this country, except in very limited quantity. Canada has furnished us a small amount, under the reciprocity treaty; the balance has been imported. That it will continue to be worked in increasing quantities can hardly be doubted. It is, therefore, a question of singular importance whether this class of wool can be raised to advantage upon the soils of New England, and especially in Massachusetts. The experience of the farmers of this State, in years past, in raising *Merino* wool was generally unfavorable to its continuance, leaving an impression upon their minds that wool-raising in Massachusetts may as well be given up. Your Committee believe that there are reasons why the business of raising the finer clothing wools, such as the different grades of

Merino and Saxony, may properly be yielded to the great States of the interior, and of the West and South. These sheep are adapted to run in very large flocks, and can undoubtedly be more easily and cheaply kept on the broad acres of the Middle and Southern, and the boundless prairies of the Western States. We may safely grant to these States an advantage over us in New England, and in Massachusetts particularly, in producing the finer wools. But how is it with the long-wool sheep upon which our combing wool is to be grown? A change has taken place within a few years, which decidedly affects the business of wool raising; that is, the great rise in the price of long wool. In the judgment of your Committee, there are many reasons in favor of the long-woolled sheep being introduced into New England, and even into Massachusetts. There are facts going far to prove that they may be cultivated here to a decided profit. Any one, it is believed, who will take the trouble to investigate the subject, will find the following statements strictly within the bounds of truth; and they are facts which certainly have a very important bearing on the question.

First: The wool grown upon the thoroughbred Leicester, (Bakewell or Dishley,) the Cotswold and the Lincolnshire, is now, and has been for several years past, worth more in our markets than the average of Merino. Second: These breeds of sheep yield at least one-third more clean wool than the Merino. Third: They yield one-third more lambs than the Merino. Fourth: The mutton of these breeds of sheep has been for years past, and is now, worth in our seaboard markets from twenty-five to fifty per cent. per pound more than that of Merino, that of the native being valued between the two.

The same, or nearly the same, is true in regard to the various breeds of Downs, such as the Southdowns, the Shropshire Downs and Hampshire Downs. They are very prolific. The mutton is equally if not more valuable. The lambs mature earlier for market, and bring the very highest prices. The wool is much sought after for delaines, and brings a high price. The yield of wool is larger than from the Merino, though not as large as from the Cotswold. Now, in view of these facts, may it not be wise for the farmers of Middlesex County, as well as those of the State, notwithstanding their past experience under a state of things widely different from what now exists, to make prudent and careful trials in the business of raising long-woolled sheep? They are large in size, quiet and domestic in disposition, requiring little if any more care than horned cattle; in fact, will run with them in small numbers like cossets. They enrich rather than exhaust pastures. They fatten easily upon roots which can be raised with great facility, the custom in England being to sow turnips and rape late in the season, and turn the sheep into the lots to help themselves. Your Committee favor such trials by all who can do it with facility and proper skill. "Nothing is worth doing that is not well done." It is not to be expected that all who may attempt it will meet with equal success, any more than we may look for equal results in any business. With good planning and skilful attention, it is believed the business may pay well. Great care and good judgment is necessary in the selection of the best breeds for the production of *combing* wool and *mutton*, having an eye to hardiness, quiet disposition and prolific tendencies. Skilful treatment is the next study. Hurdles, which may be cheaply constructed, are successful on many farms; they are effectual at a moderate height. The writer has seen the Cotswold kept in herds by these fences not over three feet in height. They may be moved about at a trifling expense of labor, giving opportunity to divide lots, on one part of which there may be crops growing.

The show of sheep at the fair was meagre in the extreme, the Texel, or Mouton Flandrin, exhibited by Mr. Chenery, comprising nearly all worthy of notice. This is a new breed in this country, and is yet to be proved in comparison with the Cotswold and Leicester. They are undoubtedly good for mutton, and the wool is of the combing quality, which is in great demand. They are awarded the first premium. Mr. Charles A. Monroe, exhibited one ewe eighteen months old, which, though a very small contribution, if taken with the statement, is an exceedingly valuable one, for it strongly illustrates, as far as it goes, the doctrine of this report. It was not Southdown, as represented, but probably a cross between native and Cotswold. It had a fleece of long staple wool fit for combing, and a good carcass for mutton. Ten to twenty of such sheep on most of the farms in the county would show good results. Particular attention is called to Mr. Monroe's statement. He is awarded the second premium.

The Angora goats exhibited by Mr. Chenery are worthy of special notice. The introduction into this country and propagation of these animals here cannot but lead to important and highly valuable results, for although we have as yet very little machinery capable of working to advantage the beautiful "silvery fleeces" furnished by these goats, it is only necessary to be known that this elegant material can be raised here with facility, to induce manufacturers to provide the means to work it. The greatest improvement yet to be made in the manufacturing interest of this country is in the line of what may be termed the luxuries, or fabrics for the "upper ten," for which we are now paying to foreign countries millions upon millions of dollars annually. The sooner they are produced in our own, the better for all. Your Committee are enthusiastic in their belief that all contributions tending to encourage the art of manufacturing in this country, the *finer fabrics*, for which we pay such large sums abroad, are entitled to high commendation. In their judgment great credit is due to Mr. Chenery for the enterprise he has manifested in this direction; and although he may share the fate of most pioneers, his ultimate success is beyond a reasonable doubt. They recommend that a suitable testimonial be presented to him by the society, in consideration of this rare and valuable exhibition.

For the Committee, J. C. CONVERSE, *Chairman.*

WORCESTER.

From the Report of the Committee.

Your Committee, in presenting their Report, regret that there was not a better display of sheep, and that a number of those exhibited were not of that character which is the most profitable for farmers in Worcester County to raise.

It is to be feared that some farmers will lose their interest in sheep, now that wool has fallen so apparently in value; but we would remind them that the gold value of wool is higher to-day than it has been at any time since 1861. And the wool grown upon the true long-woolled sheep is now worth as much as at any time during the war. First-class brook-washed wool from the pure Leicester, Cotswold, Lincoln or Teeswater is worth eighty-five cents per pound. But we would call attention to one fact, and that is that a large amount of what many of our farmers term long wool is not so, but a loose, wild, hairy kind, produced from the native sheep, and is only fit for blankets. This class of sheep has been crossed to some extent with the regular long-woolled sheep or their grades ; and while we admit that these sheep produce good lambs and sell for good prices—as, for instance, Mr. Kelley, who exhibits five ewes a cross between the native and long-woolled sheep, one of which shows traits of the Cotswold, says that from these ewes he raised eight lambs, which, at four months old, averaged eighty pounds each. Such ewes as these, when their productiveness is only concerned, deserve an honorable place in any report ; but there is a large quantity of such sheep which carry just enough of the true long-woolled character to make the wool applicable to some of the purposes to which the pure long wool is applied, and particularly so at the present time, when there is such a scarcity of the pure long wool. This enhances the value of the native wool with which it is crossed. But to keep these grades, it costs as much time and food as to keep the best pure breed, and the wool from the latter is worth from twenty to thirty cents per pound more than the former, and their lambs would mature quicker, and the ewes would be no less prolific, while in wool alone they would yield from a dollar to a dollar and a half a year more than the grade. But the wool from the pure breed is worth from thirty-five to forty cents more per pound than the hairy native, and will yield from two to two and a half dollars more value of wool in a year. This is a consideration worthy the serious attention of the farmers.

We desire to call their attention to a few other considerations. The first is one which is sometimes raised as an objection to the long-woolled sheep, and that is, that they do not do so well in large flocks as the Merino. Now, as Worcester County farmers do not keep large flocks, these sheep are well adapted to their use ; and being very quiet, they do not require as much fencing in as many others ; and being so much larger, are not so liable to be attacked by dogs as smaller ones.

We desire also to call the attention of the farmer to a very important point in raising long wool. Its value is greatly enhanced or depreciated by the manner in which it is kept. Neither the quantity nor the quality of the feed of the sheep can be materially changed without making a serious defect in the staple; and as the value of this wool depends very much upon the strength of the staple, farmers who keep this class of sheep ought never to let them fall off in condition. Farmers in this section, and in almost every other part of the United States, who keep the long wool sheep, make a serious mistake in allowing their sheep to run down in condition in the fall and winter. This makes a weak place in the staple, which is a serious drawback to its usefulness. How can the farmer expect very valuable wool from ewes who produce a large number of lambs? Farmers love to boast of their lambs and the number they sell to butcher. This, however, is generally done at the expense of the wool. The farmer ought always to bear this in mind—that in raising this class of sheep he has three objects in view, and not one. These sheep are intended for mutton, lambs and wool; but when we speak to our farmers about their sheep, they always tell us about their lambs; never say anything about wool, unless asked; and as for mutton, why, you might infer from their silence on the matter that they had yet to learn that there was such an article of diet.

Some of our farmers are beginning to think that there is a plethora of wool, and there are others who are favoring such an idea; but it is certainly a most erroneous one. The production of wool is far from being equal to the consumption. The imports of wool at New York alone, the present year, up to the 25th of August, have been 32,148,682 pounds, while for the whole year of 1865 there were at the same port but 33,354,849 pounds; while in 1860, when the wool produced in the United States was about half what it now is, the imports into the whole country were but 20,000,000 pounds. From Canada we import over 2,000,000 pounds of combing wool, and one of our largest manufacturing establishments has been purchasing largely in England the present year. Our farmers will readily perceive that with all the increase of production it has not kept pace with the consumption, for to-day we are more indebted to the foreigner for wool than we were in 1860.

There is another point to which we desire to call the attention of the farmer, and that is, the increased demand for mutton. A few years ago the taverns were few which placed mutton on their bills of fare, and in private families it seldom graced the dinner table. Now mutton is found at every tavern, and travellers partake of it nearly as often as they do beef, while it is not unknown upon the table of the private citizen ; and if we could only induce our farmers to furnish us with a good article, which they might easily if they would only raise the Southdown, the Leicester and Cotswold, it would be very easy to make the people understand that it was to their advantage to purchase it in preference to any other meat ; for it is much more nutritious than beef, far more healthy than pork, and contains much more nutrition, and can be produced at a far less cost, and they need entertain no fears that the market will soon be overstocked.

There are seven contributors and seventeen entries, and only three specimens of pure bred, long-woolled sheep. Mr E. F. Champney, of Grafton, exhibits an Oxford Down ram four months old ; William U. Maynard, of Shrewsbury, exhibits a Leicester ram—a very good one ; and G. C. Rice exhibits a very fine formed Leicester ram lamb, four months old, which weighs 110 pounds.

Mr. Albert Kelley, of Auburn, exhibits five ewes, cross with the long wool and native. G. C. Rice, of Worcester, exhibits ten ewes, Southdown, and some long-woolled breed. William U. Maynard exhibits eight ewes, Leicester and Southdown. This cross is held in higher estimation for mutton by epicures than other crosses or any breed, while its wool for many purposes is excellent, but is surpassed by the pure breed for braids and lustres. Mr. F. M. Wood, of Grafton, exhibits five Merino ewes, three rams, and two ram lambs five months old. J. H. Wall, Jr., of Leicester, exhibits five Southdown ewes, one Southdown ram, and three ram lambs five months old.

Your Committee had some difficulty with classing the Southdowns, as the society only offered premiums for long wools and short wools. The Southdown properly belongs to neither class, but is a middle-woolled sheep. But as it did formerly belong, before the days of improvement, to the short wool, and as it is a mutton sheep, and that of the very best, we classed it with the short wools, and gave to the five ewes the first premium for short wools. Had this not been a mutton market, and sheep-raisers not depending upon wool for profits, the Committee would certainly have decided differently.

Mr. G. C. Rice says of his ewes, that from twelve head he had fifteen lambs, twelve of which he sold $86.25; kept three ewe lambs and sold wool for $24.57. If we allow $7 per head for the three ewe lambs which he kept, which is a little below the average at which he sold, we shall have for the whole annual product of these twelve ewes $131.82, being very near $11 per head. Comments are unnecessary.

THOS. WHITTAKER, *Chairman.*

SWINE.

MIDDLESEX SOUTH.

Statement of Jabez Newton.

The breeding sow with eleven pigs by her side which I offer for premium is three years old, and of the Mackey breed. She has had six litters of pigs, numbering sixty-six, all of which have been reared so far without accident. She has had three litters of eleven pigs each, and raised them all. Her last spring litter I sold for $117. The pigs on exhibition are one-half Mackey and one-half Suffolk; their age is four weeks and two days.

It has been my experience which has run over the space of thirty years, during which time I have raised annually, with one exception, from one to three litters, that a sow two years old and upwards will rear more and better pigs than one under that age. "A calf from a young cow, a pig from an old sow," is correct. As the male exerts a decided influence upon the offspring, I am somewhat particular upon this point. I find a journey of four or five miles, or even more, to secure the service of a proper animal will pay handsomely.

A sow kept for this purpose should not be fed high, and for a week or so after breeding should be fed more sparingly than after that period. Milk and potatoes are the best of food for a sow in milk. If milk is not handy, scalded meal is a good substitute. I am not in favor of frequent feeding; to feed regularly three times a day is sufficient and at each time give only what is required. I do not salt as much as some, but am in favor of the occasional use of sulphur. I have always practised, and found the use of white lye is beneficial. To prevent accident in time of labor, I have found it an excellent practice to handle them frequently for a few weeks previous, until they become quite tame; they may then be approached when assistance may be necessary.

PLYMOUTH.

From the Report of the Committee.

According to the instructions given to the Committee for making reports, we think our task somewhat delicate; not what we have *done*, but what we have *to say*. We suppose all that enter an animal for the society's premium expect to get the first. It is natural to us all to think we have the best. Mr. Leach, had a good litter of pigs with his sow; they looked plump and even, which showed he was a good breeder, although mostly of native stock. His boar we thought rather coarse for clear Chester stock in limbs and in his general looks; although his pigs were good, we considered they took it mostly from the mother; still, according to Mr. L.'s statement, "his keeping all summer has been nothing but bush pasture," which, if true, speaks well for the boar or the pasture. Not that we would recommend bush pastures for general use, but such as his must have some good qualities in it for the swine kind. Mr. Beebe's sow is undoubtedly of pure stock, and he took much care to raise and breed from her. The only fault of the Berkshire stock is that lack of uniform thickness in their pork. They are far behind the Mackey, Suffolk or Chester in that respect, and have within a few years ceased to be a favorite with breeders or pork-raisers in this section. Mr. Hobart's sow and fourteen pigs were worthy of notice, but in the minds of the Committee she was not equal to the emergency.

Much has been said in favor of foreign stock, and capital expended for the improvement of swine, and much has been accomplished; but it will not do to rest where we are; we must, in order to gain any permanent benefit from what has been done, continue to breed from the best, and make judicious crosses. In order to get a good stock of pigs, we must know what we want. If the sow is long or rather coarse—decidedly the best for a milker—cross with boar of a finer build; by so doing, we get what is good. There is no reason why we of the Old Colony are not as capable of perfecting as good a breed of swine as they of Chester County, Pennsylvania. All it wants is more attention to the business. If we make more pork in the county than is consumed in it—which according to statistics we do—why should we not exert ourselves more, and raise *all our pigs* to make the pork from? By so doing, we not only live more within ourselves, but insure to all lovers of pork a good and healthy article, and thereby keep the hog disease as far West as possible. For the Committee,

JOS. C. NORTON.

POULTRY.

MIDDLESEX SOUTH.

From the Report of the Committee.

Particular attention is invited to the accompanying written statements. Such detailed experiments are of more value than opinions and essays. They make the best "poultry book" for a beginner in the business.

It will be seen that profits are calculated at current market prices for eggs and poultry. It is very easy to swell amounts by giving for fancy fowls. But such is not a true criterion, and only discourages the man who has the common breeds and ordinary conveniences.

The number of eggs laid per hen is the minimum rather than the maximum, varying from 120 to 170 per year; and yet the net income per fowl in no case is less than $1.37, which is 150 per cent. on the investment.

Probably, if any of our farmers, or any housekeeper who has a quarter of an acre of land, would keep twenty-five fowls, and feed and care for them according to well-established methods, and keep an exact account, they would be surprised at the year's results. There need be no failure. The hen will lay eggs as surely as the cow will give milk, the quanity in each case depending on proper management. With suitable food and drink, and gravel and lime in abundance, and a roost free from vermin, and a warm shelter for the winter, a young hen may be depended on for 150 to 175 eggs per year. At lowest prices these will sell for $3.50 ; and at highest prices the keeping will not exceed $2, leaving $1.50 net profit.

Then the manure, if properly managed, will furnish a sufficient stimulant for the various crops of a large garden. The droppings of twenty-five fowls is a sufficient basis for ten bushels of compost, better than any foreign guano. A farmer who cultivates four acres of hoed crops can afford to keep forty fowls from November to April, for the manure alone, making no account of eggs. This may seem a strong statement to those who allow the droppings of the hen-roosts to dry up and go to waste. But repeated trials, for a series of years, have satisfied your Committee that it is correct. The method pursued in saving and preserving the manure is this : A slight excavation is made in the ground under the roosts, and boards a foot wide are set up round this space, into which all the droppings fall. Late in autumn this is carefully cleaned out, and three inches of fresh sand is spread over the bottom. No water from the eaves or higher ground must be suffered to run into the bed. In April, before the warm weather starts fermentation, work over thoroughly bottom sand and all, adding a little dry sand, if necessary, to pulverize it. Prepare a sort of mortar bed in the barn cellar or shed, or wherever rain and sun can be kept from it, to which transfer the mass, as fermentation under the roost will injure the fowls as well as dissipate the ammonia. In this bed work into it twice its own bulk of pulverized peat or fine loam, and half its own bulk of fresh ground plaster ; cover up and let it alone till wanted for use. The best way to make the compost, is to spread peat or loam at the bottom, then a layer of hen manure, then a layer of plaster, each in its proper proportion, and so repeat, till all is used. If immediate effect is desired, at planting time mix a little wood ashes with such part, as you take it to the field ; but never put ashes in the heap, as it will set free the ammonia ; and cover from the air as soon as dropped in the furrow. For small and tender seeds it should be worked into the soil. For corn, beans, beets, &c., drop in the furrow and cover lightly with the foot before dropping the seed, as direct contact will often destroy the life of the seed. When the compost is rightly proportioned, half a gill is sufficient for a hill of corn.

From careful experiments, it is believed to be safe to say that this compost, judiciously applied, will add one-sixth to the quantity of most of our garden and field crops, besides pushing them forward a week in advance.

When the winter droppings are removed, fill the space under the roost with fine loam—sand will be too drying in warm weather—as before, and once a fortnight, spread over a light coat of plaster and fresh loam. When ready to prepare the hennery for winter, work over thoroughly, and put two shovelfuls round each of your pear trees, and spread the balance on grass land, where you will see the effect for five years.

The winter product of forty fowls, when composted, will be twenty bushels; the summer product ten bushels.

A prime object with the poultry breeder, whether he looks to eggs or chickens for profit, is to keep up the health of his stock. If for any cause, this deteriorates, all his plans are disappointed. The number of eggs laid decreases, and when put under the sitting hen they fail to hatch, or the chicks die prematurely. In all these respects something depends on the breed; but when in high health, almost any of our well known breeds will meet reasonable expectations.

Among the causes of deterioration, may be named:

1. Too close confinement. This happens mostly with breeders who have several varieties, and wish to keep them separate; and with such as have near neighbors and limited grounds. Some overcrowd the capacity of their hen-house and yard; inferring, without due reflection, that if twenty fowls thrive and pay a large profit, forty of course, will pay double; not considering that forty need more than twice the room and range which suffices for twenty.

2. Injudicious feeding. Chicks should never be fed on fine meal nor watery pudding, nor should fowls be fed on meal, except for a change, and where you would force the fattening process. Very coarse Indian meal, slightly wet, is best for young chicks, and whole grain as early as they will take it. Whole grain should be the main feed for fowls. Their natural habits, and the structure of the stomach, determine this point. Fowls must have plenty of fresh water, and must be fed at regular

hours, and want their breakfast very early in the morning. For laying fowls, animal food is a necessity.

3. Want of lime. This in some shape should be kept always at hand; young chicks eat it freely to assist in the formation of bone; and old fowls to repair waste, and form the egg-shell. Lime and sand, mixed as for plastering, and when dry broken up, is perhaps the most convenient way of supplying this want.

4. Unclean quarters—where droppings and feathers are left to accumulate for years: and where the roost and walls are filled with vermin. The hennery, however situated, should be thoroughly cleaned out twice a year, and the roost and sides whitewashed. Where the quarters are confined, fresh sand should be liberally sprinkled over the floor, and the nests be renewed several times in the season. A broad, shallow box of dry sand and ashes for wallowing is a necessity in every hen-house.

5. Cold quarters in winter. This effectually undermines health, and produces immediate as well as remote evil effects; empty nests through the winter, tardy laying in the spring, a poor worthless carcass, and feeble chicks.

6. Too many eggs under the sitting hen. In March nine, in April eleven, in May thirteen, are as many as medium-sized fowls can keep at the proper heat. More may hatch, but they will not pay in the end. Eggs kept uniformly at the proper heat will hatch a day earlier, and the brood will come to maturity a month earlier.

These hints might be elaborated indefinitely; but it would be out of place in a report of a Committee.

For the Committee, J. H. TEMPLE.

Statement of J. H. Temple.

The following statement covers a period of six months, from March to September. Number of fowls, twenty; comprising five full-blood white Leghorns, five Plymouth Rocks, and the balance a cross between the two breeds.

INCOME.

Number of eggs laid in the 6 mos., 137 dozen.

137 dozen, at 33 cents amount to, . . .	$45 20	
Chicks sold, ...	4 64	
30 chicks on hand at 60 cents, . . .	18 00	
		$67 85

Expenses.

9 bushels corn, at $1.10,	$9 90	
2 bushels meal, at $1.10,	2 20	$12 10
Leaving a net profit of,		$55 75
Value of stock; five at $1.00,	$5 00	
fifteen at 75 cents,	11 25	$16 25

Thus the net gain on the investment will be 343 per cent.; and the net profit per fowl $2.80 for the half year.

The eggs are reckoned at the average store price, and the chicks at market rates for dressed poultry.

Mode of Feeding.

The ordinary mode of feed has been, corn morning and evening, and the scraps from the table at noon. Occasionally, I mix up coarse meal and bran with sour milk, for all my stock. They relish it, and it seems to quicken appetite. The brood hen when confined in coop, should have grass or some green vegetable food, twice a week. For winter feeding, I should supply a greater variety, and some more animal food. Lime and sand mixed, and when dry, broken up, is kept by them all the time; and pounded crockery is freely given twice a week. As my fowls have the range of the barn and yards, they need no other vegetable food, and during the warm season they get all the animal food necessary. This saves materially in the cost of keeping. Young chicks I feed on cracked corn, slightly wet with water, with warm boiled potatoes for a change. They will, however, take whole grain quite early.

Experiments in Fattening.

Feeding as I do, fowls are kept sufficiently fat for health and laying, and if wanted for the table or market, can be easily fattened. I shut up some old hens in a coop out of doors, and fed on whole corn alone, giving them all they would eat three times a day, with fresh water every day, and in ten days they were fat as butter. But I had doubts about the result with young chicks. To settle the matter, in August I put four roosters only three months old in a small coop with latticed front, out of doors, and crammed them with all the whole corn they would eat thrice a day, with fresh water, and the eighth day killed, and found them fat. As near as I could judge—comparing them with others killed from the same brood—the grain was one ounce each per day, or one-half a pound in eight days. As they were my small breed, weighing only two pounds each, this is certainly a great gain.

From long experience, I am satisfied that whole grain is best for feeding and fattening. It is more natural food, as the habits of birds, and the structure of the stomach indicate, and the fowl will be less liable to disease. The vigor of the system will insure rapid fattening, when cooped and crammed. But care must be taken lest they be confined too long; ten or twelve days is sufficient, and a longer time will be likely to destroy health.

I should state, that I prefer Western flat corn, to our flint corn. In my experiments, I used sound Western mixed corn.

J. H. Temple.

Framingham, September, 1866.

Statement of Lewis Jones.

The twelve fowls which I present for exhibition are of the Leghorn and Black Hamburg varieties. Three of them are about sixteen months old, the rest were hatched about the first of May last, so they are a little over four months old. Some of the pullets have already commenced laying. They are a very tame kind of fowl, and may well be termed everlasting layers, as my old fowls have not stopped laying since they commenced last fall. I keep some native fowls to do the sitting and bring up the chickens.

I kept last winter seventeen fowls: fifteen hens and two roosters. Five of the hens were natives. From the fifteen hens for six months, commencing the first day of November, and ending the last day of April, I sold seventy-nine dozen of eggs, and sat five dozen. I kept no account of what were used in the family. The eggs sold averaged about forty-five cents per dozen.

79 dozen of eggs, at 45 cents per dozen, .	$35 55
Sat four hens on four dozen of eggs, and raised 36 chickens, worth, ...	36 00
	$71 55

Expense of keeping 17 fowls 6 months:		
10 bushels corn, $10; fresh meat and scraps, $2.50,	$12 50	
Expense of keeping 36 chickens, 4 months,	9 50	
		$22 00
Profit,		$49 55

I have reckoned the chickens only at their market value; but I would not sell my pullets for two dollars apiece.

Keeping.

I let my fowls run at large both winter and summer; they being a kind of fowl that have not done me much damage by scratching. In the winter, I leave the south doors of my barn open pleasant days. I have a shed adjoining the barn, in which I keep sand, so that the fowls can have a chance of wallowing, which they seem to enjoy much on warm, sunny days.

Feeding.

I feed my fowls three times a day, winter and summer; and they come for their meals as regularly as my hired help, and are off about their own affairs. I always keep a plenty of clean water by them, both in the summer and winter; and a person not acquainted with their habits would be astonished at how much water they will drink daily. In the winter, to help them make their eggs, I give them, two or three times a week, old plastering which has been removed from buildings, pounding it up until it is about the size of kernels of corn. Occasionally I give them oyster-shells pounded up. Likewise I give them refuse bones from the table which are soft enough to be pounded or chopped up; and also, occasionally, I give scraps, and sometimes cheap meat, chopped up, bones and all, with a cleaver, which the hens are very fond of, two or three times a week.

RECAPITULATION.

79 dozen eggs, at 45 cents per dozen,	$35 55
36 chickens,	36 00
	$71 55
Expense of keeping,	22 00
Profit,	$49 55

WAYLAND, September 18, 1866. LEWIS JONES.

THE DAIRY.

ESSEX.

From the Report of the Committee.

There are many things to be considered in making good butter and in making it profitable. First, good cows are indispensable, as there is much difference in the quantity and quality of the butter made from them; hence every person should know the quality of each cow separately. Good keeping is also necessary, as it has much to do with the quality as well as the quantity of the butter. In addition to English grasses, green corn-stalks, pumpkins or carrots are good keeping for butter. Next, a good place for setting the milk. It should be cool and dry, with good ventilation, and, as much as possible, let the air draw through the room. The room should also be kept light, as light tends to make the butter yellow. Care should also be taken that nothing having an offensive odor should come in contact with the butter, as it rapidly imbibes anything of the kind. It is therefore necessary that all the utensils used in the process of butter-making should be kept perfectly clean and sweet.

With regard to the process of making butter, we cheerfully refer to the statements of those ladies who receive the premiums.

It is said in some of the Eastern countries, at the present time, they churn their butter as follows: Put the milk into bottles made from the skin of the goat, put it on the camel's back and start for market; when they arrive, the butter is ready for use. Such butter would hardly be expected to receive a premium at our fair. JOSEPH HOW, *Chairman.*

Statement of Mrs. Carleton.

I present for your inspection eighteen pounds and ten ounces of butter, made in September, from the milk of six cows in two days and a half. The milk was strained into tin pans and placed in a cool and well ventilated room, the cream taken from the milk in thirty-six hours after being milked, then churned, and salted to the taste after standing in a cool place twenty-four hours. It was then worked over till the buttermilk was all out.

Statement of Mrs. George Spofford.

I present for premium fifteen pounds of September butter, made in the following manner: The milk was strained into nicely scalded pans and allowed to remain so until sour, in a well ventilated room; then skimmed into tin pails; stirred once a day until churned. When taken from the churn, salted to the taste; then set away until the next morning. Worked with the hands and made into balls as presented.

Statement of Ezra Batchelder.

I present for your inspection fifteen pounds of September butter. The process of making is as follows: The milk is strained into tin pans and set in a cellar prepared for the purpose, and allowed to remain from thirty-six to forty-eight hours; the cream is then removed to stone jars and stirred twice a day. We churn once a week and salt to the taste. The butter is worked by hand twice and formed in pound lumps.

MIDDLESEX.

From the Report of the Committee on Butter.

Whoever will take the trouble to examine the "Transactions of the Middlesex Agricultural Society" for the last ten years, must be struck by the meagre character of many of the reports of the Butter Committees. As a usual thing, beyond a mere statement of the awards, almost nothing has been hazarded either in the way of criticism or suggestion. Your present Committee venture to step out of this beaten track, and to say that they do not believe that the premiums are accomplishing the amount, and especially the *kind* of good which they ought to accomplish. And they are the more emboldened to do this, when they remember the great agricultural value of the article which they have under consideration. Butter, with the exception of hay, and possibly live stock, is the product of the farm which in Massachusetts has the greatest money value. In this respect it is equal or superior to the corn crop, much superior to the potato crop, and probably worth more than the oat, barley, wheat, orchard and market-garden crop together. Judging from the past, it may be assumed that the yearly product of butter in Massachusetts is from 8,000,000 to 9,000,000 pounds, worth, this year, at the farmer's door, more than $3,000,000, or an average of about $100 to each and every farm in the State. It is evident, then, that anything which tends to improve the quality or increase the ease and certainty of its production is of vital importance to our farmers. Our system of agricultural premiums ought to do more than reward personal skill. It ought to acquaint us with the principles and method which are back of that skill; and certainly it should be possible to deduce from the experience and practice of some dozen of the best dairywomen in the county definite ideas and rules about butter-making. Well, we have before us the statements and the methods of more than a dozen of such, and after a repeated and sedulous perusal of them, we are unable to say whether the beautiful specimens before us came from "a pure knack" in the individuals of doing about right, or are the results of wise methods faithfully followed. The difficulty is, the requirement of the society, as interpreted by contributors, does not bring us full and precise statements of the hows and whats and whens of butter-making from the beginning to the end of the process. And they, above all things, are what we need to know. Would it not be wiser to give fewer and larger premiums, and demand, in return, more minute accounts? Or else to give an additional premium to whoever should furnish at the same time excellent butter, and as excellent a story of how it came to be so good?

The character of the dairy-room and the temperature maintained in it; the number and kind of utensils used; the time which the milk is allowed to stand before skimming; how often the churning takes place; whether the cream and the churn are raised to any special and mutually equal temperature; whether cold water is used at any stage of the work, and if so, when; how much salt is put in, and how and when; whether the butter is worked with the hands, or with a wooden spoon, or with both; the manner in which the stock is kept and fed. These and many other things exercise, no doubt, an important influence upon the result. And it would seem as though the statements of the contributors ought to shed a great deal more light on these points than they do; and that good butter-making ought to be less an accidental personal peculiarity, and more a trade, with definite rules and habits, which can be learned and practised by anybody. It would seem as though every good dairy-woman ought to have on these points not only correct instincts but intelligence, and that it is the work of the society to demand and to cultivate this accurate intelligence. It may, indeed, be said that farming is not in any department an exact science. That is true. But there is no department which so nearly approaches it as that of the dairy. And though your Committee—at least the chairman thereof—disclaims any profound insight into the practical details of the work, yet "he guesses," and indeed has it "impressed upon his mind," that nothing pays better in butter-making than to have precise methods and to stick to them; and he hopes that the society will from year to year grow more and more pressingly curious in its questions, until it finds out what these methods are.

As to practical lessons this year. Judging from the specimens exhibited, and from the accompanying statements, your Committee would say with diffidence that it would seem, *first*, that cream which was not allowed to stand at the most over thirty-six hours, (in the summer twelve to eighteen hours in most dairy-rooms,) made sweeter butter than that which stood longer; *second*, that it was better to churn twice or even three times in a week than once; *third*, that one ounce of salt to a pound of butter meets more nearly the average taste than a larger or smaller quantity; *fourth*, that the quality of the butter is much less dependent upon the character of the feed of the cow than is sometimes supposed. In respect to this last point, the statements vary to this extent: "Fed on grass entirely;" "fed on grass and cornstalks;" "feed, besides usual pasture, with fodder-corn night and morning, with a pint of oil-meal and two quarts of shorts per day;" "fed, in addition to pasture, a small quantity of green corn-fodder and one quart meal daily;" "has not had any grain since the 1st of June." Yet there is scarcely an appreciable difference in the butter made under these varying circumstances. From which we deduce the conclusion that the goodness of butter depends far more upon the care with which it is made, and very possibly upon the original butter-making quality of the cow, than upon the nature of the food. Trusting that these imperfect hints may lead in the future to the requirement and collection of more definite data for judgment, and so to a more clear, accurate knowledge, your Committee conclude their Report.

G. REYNOLDS, *Chairman.*

Statement of Mrs. A. H. Park.

This butter was made from two cows, in six days ; the cream was taken from the milk after having stood thirty-six hours ; salted at the rate of one ounce per pound. The cows were fed with their usual pasture feed with fodder corn, night and morning, together with a pint of oil-meal, and two quarts of shorts per day.

CHELMSFORD, September 19, 1866.

Statement of Mrs. John S. Hartwell.

Our manner of making butter, the specimen presented for your award being a sample, is as follows : The milk is strained into pans and allowed to stand thirty-six hours, when the cream is taken off and kept in a cool place until churning day, which, with us, comes three times a week ; the buttermilk is thoroughly worked out ; it is then salted with two-thirds ounce of salt to a pound of butter. No artificial coloring matter is used at any season of the year. The cows are fed, in addition to pasture, a small quantity of green corn fodder and one quart of meal each, daily.

LITTLETON, September 20, 1866.

Statement of Sarah M. Lane.

This butter for your inspection was made from a dairy of four cows. The milk was set in tin pans and allowed to stand from twenty-four to thirty-six hours, according to the weather ; it was kept up from the cellar. I churn once a week, and use no water about the butter ; I work it twice, and use from one to one and one-quarter ounces of salt to a pound, according to my customers. The cows have had pasture feed, with corn fodder night and morning.

BEDFORD, September 20, 1866.

Statement of Margaret Pierce.

The milk is set in a dark, cool cellar, the temperature by thermometer averaging 60° to 63°. I gather the cream into a stone pot, and salt the week's cream for one cow one teacupful of fine salt, and stir the cream every day to keep it sweet while accumulating; then it is strained into the churn; it is about thirty minutes coming to butter. I then drain off the buttermilk and turn into the churn four quarts of cold well water, turn the crank three times to rinse off the buttermilk, then take it from the churn and salt it, allowing to every pound of butter two ounces of sifted salt; I put half the salt in when taken from the churn, set it into the cellar four hours, then work over by hand in a tray, working out the buttermilk, then put in the remainder of salt and let it set three hours; I then work it over and beat with wooden butter-beaters until the butter is dry. Butter made in this way will always have a grain to it and will keep perfectly sweet through the winter. This butter is made from a cow, one-half Devon and one-half Alderney, which was fed on grass and cornstalks.

CONCORD, September 20, 1866.

HIGHLAND.

Statement of Mrs. Sarah A. Smith.

CHEESE.—The night's milk was strained into a brass kettle and allowed to stand over night. Cream removed in the morning, and the morning's milk added, the whole warmed to blood heat, and sufficient rennet added to fetch the milk to curd in about thirty minutes; let it stand about ten minutes longer, and slice the curd with a wooden cleaver; after standing a few minutes longer, break the curd by hand, and dip off the whey, then put it into the basket, placing a weight upon it; when sufficiently drained, tie the ends of the cloth and hang in the cellar till ready for the press; the same process taken with the following two days' milk. The three curds are then sliced fine, and put into the kettle and about two gallons of hot water poured upon it, then carefully stirred so as not to disturb the white whey; let it stand five minutes, after which dip it into the basket to drain. After being sufficiently drained put it into a wooden bowl and chop fine; return it to the kettle and add a common teacupful of fine rock salt to twenty pounds of curd, mixing it thoroughly with the hands, then put into the hoop and press for one hour; the cloth is then changed, and cheese turned; the following day turned and changed again, then kept in the press till the following morning.

NORFOLK.

Statement of Mr. A. W. Cheever.

The box of butter presented by me for your inspection is a part of a churning of thirty-four pounds made by me on Wednesday and Thursday of this week. Just one week's cream was brought to the temperature of 63°, by *trial* and not by *guess*. Found the cream 5° too cold, and brought it up by fire heat, stirring constantly while warming. Churned moderately about one hour. Could have churned a less quantity in the *same churn* in less time. When the butter was well gathered in the churn, the milk was drawn off, and a bucket of cold water put in place of it, in which the butter was churned a few minutes. It was then taken on to a table, or worker, where the milk was pressed out before salting. Three-quarters of an ounce of salt was then worked in, by lever power, to each pound of butter. After standing eighteen hours, it was again brought under the lever, and the brine and milk all worked out that could be. How much there is left, you will, of course, judge. It was then immediately moulded and dropped into the box, as you see it ready for market.

The feed used by the cows is green corn-fodder, hay and grain, in the proportion of about three-quarters corn, one-eighth dry hay and one-eighth grain, consisting of two quarts of meal and three quarts of shorts. The cows are turned out to drink and exercise about three hours in the middle of the day. Commenced feeding corn August 1st ; shall have enough from one acre to last two months for eight cows. Planted it at seven or eight different times, till July 3d, at the rate of forty kernels per foot, in rows three feet apart. Very little has topped out, and next to none is wasted. The earlier plantings were hoed ; the later was cultivated only. The ground was very thoroughly worked before planting, and manured quite liberally. As I make butter all the year round, and do not let my cows calve oftener than once in eighteen months, so that those that come in, in the spring, shall not come in again till the second autumn after, I cannot obtain so large an average from my whole dairy during the summer months, as if I had my cows all come in together in the spring.

The amount of butter sold from May 25th to September 22d, this year, was 630 pounds. Average number of cows, 6$\frac{10}{17}$. Average pounds per week, 35. Average per cow, between five and six pounds. Average number of quarts per cow, June 22d, 8¾; August 20, 11 quarts; September 23, 9$\frac{7}{8}$ quarts. Average number of quarts of milk per pound of butter sold, 16. During the time two families have used milk, butter and cream, that has not been accounted for. Also, about thirty quarts of milk sold per week, skimmed at twelve hours. The butter has all been delivered by me direct to the consumers, at sixty cents per pound.

Table showing the amount of milk given in one day, measured six different times, as it was convenient, and also the time each cow has been giving milk.

	Time of last calf.	Feb. 24, one day's milk, quarts	April 7, milk one day, quarts.	May 13, do.	June 22, do.	August 20, do.	September 23, do.	Time of next calf.	Remarks.	Age of cow, years.
1	1865, April 15,	8¾	9¼	8	7½	–	–	–	Sold for beef, July 18.	8
2	1865, July 15,	7	7¼	6¾	6¼	–	–	–	Sold for beef, July 18.	4
3	1865, Oct. 15,	8¼	8¾	4¾	3	–	–	–	The meanest cow I ever saw. Half Jersey; is farrow & dry.	9
4	1865, Dec. 15,	14¼	13¾	12	12¼	11¼	8½	May, 1867.		8
5	1866, Jan. 20,	–	–	9½	10	10½	7¾	June, 1867.		7
6	1866, Feb. 27,	–	10¾	9½	9	11	9½	–		9
7	1866, Mar. 15,	–	17	14	14	13¼	9½	–	Raised her calf by feeding.	10
8	1866, April 7,	8	–	12½	14	13¾	8½	–	Raised her calf by hand feeding. Has had an attack of the garget since Sept. 1st.	10
9	1866, April 10,	–	–	–	8½	8	6½	–	Sold her calf, May 12.	2
10	1866, Aug. 10,	8¼	8¾	6	2¾	11	11¼	–	Sold her calf, August 17.	6
11	1866, Aug. 28,	7¾	7½	–	–	–	13½	–	Sold her calf, September 10.	6

Average number of cows milked from May 20th to September 20th, 6$\frac{10}{17}$.

A. W. CHEEVER.

BREAD.

ESSEX.

ESSAY ON BREAD AND BREAD MAKING.

BY JAMES R. NICHOLS, M. D.

The remarks made by a committee on bread, at the society's exhibition in 1863, are eminently proper and just. They remark, " that they can see no benefit to be derived from an exhibition of bread, unless those who are so unfortunate as to be lacking in skill ' can go and do likewise.' They can look at the beautiful loaves on exhibition, and, with a sigh, express the wish to know how to make such bread ; but the information has not been given by the exhibitors. We suggest that, hereafter, all entries of bread shall be accompanied by a statement, describing the process of mixing, kneading, baking, &c."

A premium having been awarded to bread made in my family, at the last exhibition of the society, I am induced by the expressed wishes of many, to make a statement in relation to the methods of its production, and also to present some general observations upon bread, and the science of bread making.

As regards the show of bread at the exhibition, it was indeed not of a character such as we could wish it to be. The number of loaves upon the tables was unusually large, and among them were many specimens of a quite imperfect character, being heavy, doughy, and some had passed into the acetic fermentation stage and become sour.

It is presumed that in preparing bread for exhibition and premium, the makers do their best in its production, and that a display of the kind may fairly represent the best skill in this department of household labor.

Regarded in this light, the conclusion is reached that very many families have hardly yet learned what good bread is, and that there is a wide margin for improvements in the methods of bread making. No subject is certainly more important, as it has a direct bearing upon the health and consequent happiness of households, and it should receive the attention which it deserves.

Besides the manipulating processes, the manufacture of good bread involves some other considerations of no secondary importance. It is useless to attempt its production with imperfect or bad materials. The flour or meal must be sweet and from fully matured grain. During the past two years the market has been crowded with flour of a damaged character. The severe rains and long-continued moist weather at the South and West, were unfavorable for securing the grain crops, and much of it germinated in the fields and barns and was thereby rendered unfit for bread making. In the germinating process, diastase is formed; this reacting upon the starch of the flour in the baking, transforms it into dextrine and sugar, and prevents the formation of light, spongy bread. Flour from such grain will afford only sticky, glutinous, heavy bread, no matter how much care and skill is bestowed in the making. Fungous growths also appear in wheat injured by moisture, and the flour becomes "musty." In bread from such materials, beside its repulsive physical appearance and unpleasant taste, a chemical change has occurred which renders it positively injurious as an article of diet. The nutritive properties, the gluten, especially, has undergone decomposition and new bodies have been formed, which are not of an alimentary nature. Impaired digestion, derangements of the bowels follow the use of bread from such flour. The poor, who are unable to pay large prices for choice, selected brands, suffer greatly from this source, and much of the bread they are compelled to eat is well calculated to weaken rather than sustain the vital functions.

During the most favorable seasons thousands of bushels of wheat are made into flour, which, owing to local causes, delay in harvesting, or storage in large bodies, is rendered entirely unfit to be used as food. A portion of this is employed in the arts, but the great bulk goes into families, and feeble children, as well as adults, are forced to consume it, much to their injury. It is doubtful if anything can be done to abate this evil; the cupidity of men is but little affected by considerations of right, and the thirst for gain is potent and irresistible.

There are several methods of testing wheat flour, which are available to purchasers, although none of them afford positive indications. Good flour is not sensibly *sweet* to the taste, but bad flour often is. This is owing to the presence of glucose, resulting from chemical changes in the grain, by partial malting. Extreme whiteness is a good indication, as changed grain is discolored in the process of change. Good flour is tenacious and unctous to the touch ; when thrown against a wall it should adhere and not fall rapidly. It does not feel *crispy*, and when formed into a ball in the hand, adheres together like a ball of snow. To the sense of smell it is sweet and pleasant, and when taken into the mouth, forms a glutinous mass, free from all disagreeable taste.

The nutritive quality of flour depends upon the proportion of gluten which it contains. In the best specimens ten or twelve per cent. is found. A barrel of flour contains about twenty pounds of gluten, and one hundred and fifty of common starch. The starch can easily be washed out of a small quantity of flour by placing it in a bag of cotton cloth and kneading it under a stream of water. The gluten remains upon the cloth and is a gray, viscid, tenacious mass, insoluble in water. It is the strength-giving principle of the flour, and in a three pound loaf of bread there should be at least three ounces of this substance.

Bad bread is by no means always chargeable to imperfect materials. Hundreds of families, who procure and use the most perfect flour, subsist upon bread of a very inferior quality. Some housekeepers assert that they can have no " luck " in bread making; their loaves are always heavy, or sour, or doughy, or burnt, and they give up experimenting and become discouraged. As with good materials every one can prepare good bread, there should be no want of success.

Success depends in a great measure upon good judgment, faithfulness and patience in working, and in using the right materials. It is quite preposterous to present a fixed recipe and set it up as an infallible guide in this department of household labor. The method adopted in my family, and that by which the specimen exhibited was prepared, is as follows :

Sift five pounds of good flour and put it in an earthen pan suitable for mixing and kneading. Have ready a ferment, or yeast, prepared as follows :

Take two potatoes the size of the fist, boil them, mash and mix with half a pint of boiling water. A fresh yeast cake, of the size common in the market, is dissolved in water, and the two solutions mixed together and put in a warm place to ferment. As soon as it commences to *rise*, or ferment, which requires a longer or shorter time, as the weather is warm or cold, pour it into the flour, and with the addition of a pint each of milk and water, form a dough, and knead for a full half hour. Form the dough at night, and allow it to stand until morning, in a moderately warm place; then mould and put in pans, and let it remain until it has become well raised; then place in a hot oven and bake.

The points needing attention in this process are several. *First*, the flour must be of the best quality; *second*, the potatoes should be sound and mealy; *third*, the yeast cake is to be freshly prepared; *fourth*, the ferment must be in just the right condition; *fifth*, the kneading should be thorough and effective; *sixth*, the raising of the dough must be watched, that it does not proceed too far and set up the acetic fermentation and cause the bread to sour; *seventh*, after the dough is placed in pans it should be allowed to rise, or puff up, before placing in the oven; *eighth*, the temperature of the oven, and the time consumed in baking, has much to do with the perfection of the process.

If this method is followed with the exercise of good judgment and ordinary skill, white bread of the highest perfection will be uniformly produced.

Unfermented, or "cream of tartar" bread, is never placed upon the table in my family. There are special dietary, or sanitary reasons for its exclusion. All "quick made" bread is usually prepared in haste, and the adjustment of acid and alkali is apt to be imperfect. Not one pound in a hundred of cream of tartar sold in the market is free from adulteration. In ten specimens procured from as many different dealers, in a town of ten thousand inhabitants, I ascertained by analysis that the *least* percentage of adulterating material was twenty-two per cent; and several were over seventy per cent. The "yeast powders" so common in the market are composed of acids in association with alkaline carbonates, usually bi-carbonate of soda. If tartaric acid, or cream of tartar, is used with the soda, there remains in the bread, after baking, a neutral salt, the tartrate of soda, which is diffused through the loaf and is consumed with it. This salt has aperient properties—in fact is a medicine—and thus at the daily meal, those who use bread made with "powders," or with cream of tartar, are taking food and medicine together.

Some years ago, Professor Horsford, of Cambridge, proposed substituting phosphoric acid for the tartaric, and this excellent idea has been put into practical effect in the production of yeast powders. In the use of this acid, *phosphate* of soda would remain in the loaf, and as this is made up of the element which we lose in sifting out the bran from the flour, it must prove healthful, or at least unobjectionable. But bread prepared by *effervescing* powders is, at best, a poor substitute for that which results when the dough is raised through the agency of vinous fermentation—regular yeast, in some of its forms, being employed. Effervescents may be used in exigencies, which occasionally occur, but it is hoped that the good housewives in our county do not, in their bread making, habitually depart from the good old way of raising the loaf by panary fermentation.

It was a noticeable fact that no specimens of whole meal, wheaten, or corn bread was offered for exhibition. It is presumed that the premiums of the society were intended to include these forms of the " staff of life," and it is a matter of regret that none were presented. There is manifestly a perversion of sentiment, or fashion, as regards bread made from the unbolted meal of wheat, which ought to be corrected. Why, upon the tables of farmers, the white flour loaf should usurp the place of the darker, but sweeter and more healthful one from the whole meal, is a question of no little interest and importance. In Essex County but few soil cultivators raise this noble grain in quantities large enough to meet family wants, and it is probable if the reverse of this were true, the grist would be carried long distances to a mill with a bolt, to separate the fine flour.

If there is any one form of bread more delicious than another, or more conducive to the sustentation of the physical and intellectual powers, it is that from unsifted wheat meal; and every owner of land should include this grain among his crops, that he may have the bread fresh and in its highest perfection. A generous dressing of finely ground bone will put almost any field in condition to grow a profitable crop; and in these days, when Western flour of the better sorts commands such enormous prices, there seems to be no good reason why farmers should not resume the cultivation of wheat in our county.

Corn bread is also excellent and most nutritious. It contains a large amount of oil not found in other grains, which adds greatly to its value. There is far too little of this used in our families. The old-fashioned dish of corn "pudding and milk" is now nearly as obselete as that of "bean porridge;" and may we not, with much reason, attribute the physical degeneracy of the present race to the radical changes in the forms of food? Regarding the matter from a chemical and medical point of view, it certainly would be difficult to select better or more healthful forms of human nutriment—forms so well calculated to build up and sustain a "sound mind in a sound body," as the two named above, once so popular, but now banished from our tables. They were easy of digestion and assimilation and contained all the chemical substances, or organic and inorganic constituents needed to nourish the body and mind. Certainly, white flour bread, cake and condiments, are poor substitutes for the sensible, but plain dishes, of our fathers and mothers a half century ago.

FRUIT AND FRUIT HOUSES.

ESSEX.

ESSAY ON THE PRESERVATION OF FRUIT AND THE CONSTRUCTION OF FRUIT HOUSES.

BY ROBERT MANNING, OF SALEM.

Twenty or thirty years ago, when winter pears began to be generally cultivated, much disappointment was experienced by cultivators, who found them hard, green and tasteless, instead of juicy and delicious, as they had been described. But with the introduction of better varieties, improved cultivation and the maturity of the trees, under our hot suns their ripening became so accelerated, that pears, which should have kept until midwinter or later, could not be preserved to the end of December, and the inquiry was for means to retard rather than promote their maturity. I need not spend time in arguing the necessity of such means of preservation, especially to those who have found their late pears ripe and gone from one to two months earlier than they had anticipated.

The ripening of fruit is the completion of the chemical process by which starch is transformed into sugar, and is the first step toward decay. Decay is a process of fermentation, and is but the continuation of the ripening process. Whatever promotes fermentation will hasten the ripening and decay of fruit; whatever retards fermentation will tend to its preservation. The conditions necessary to the perfect ripening of fruit on the one hand, and its preservation on the other, may be stated as follows:—

1. Unless fruit attains a certain degree of development upon the tree, the ripening process will not continue after it is separated from the tree. So true is this, that when one side of a fruit is fully and the other only partially developed, the ripening will be confined to the former part, which will be rich, melting and juicy, while the latter will remain hard, green and tasteless. This is not unfrequently seen in the Easter Beurre pear.

It is desirable that fruit should remain upon the tree as long as possible without too great risk of injury from hard frosts or by blowing off; but nothing is gained by allowing it to hang after the leaves have fallen, whether from disease or natural ripening. From the first to the middle of October will be found the best time for gathering winter apples and pears here; but on dwarf trees or in sheltered places it may hang longer than on tall standards or in exposed situations. I have kept pears on the tree until the middle of November, but without deriving any advantage from it.

2. The fruit must be gathered carefully when perfectly dry, and MUST *not be bruised or chafed.* The waxy secretion found on the skins of fruit, especially grapes and plums, and less abundantly on apples and pears, is a natural provision for the protection of the skin from the effect of moisture; and therefore the skin should not even be wiped lest the bloom be removed. When the skin is broken by bruising, so that the oxygen of the air comes in contact with the juices of the fruit, fermentation commences immediately, and decay soon extends throughout the fruit.

3. Fruit must be protected from frost, which is well known to completely disorganize its texture.

4. It must be kept from too great a degree of heat, for this is a most powerful agent in promoting fermentation.

5. The proper temperature being ascertained, it must be kept *uniform*. The expansion and condensation of the juices by variations of temperature hasten their fermentation, instead of permitting it to take place slowly and gradually, as desired. But though it is well known that apples and pears may be exposed to a temperature a few degrees less than 32° for a short time without material injury, it is found that when kept long at a temperature but little above freezing, the ripening process is checked to such a degree that it is never perfectly resumed; and experience has shown that a uniform temperature of 40° is as low as is advisable. Fruit may safely be exposed to still air of less than 32°, when it would be injured in currents of the same temperature. It seems hardly necessary to say that a thermometer is indispensable in a fruit room.

6. Light is one of the strongest stimulants of vegetable growth. Its effect on the skin of the fruit continues, though in a less degree, after it is separated from the tree, and therefore the fruit should be kept as far as is possible in total darkness. Not only does it keep better, but the flavor and color, both of summer and winter fruit, is better when the light is excluded.

7. The atmosphere should be uniformly dry, for moisture is not only necessary to fermentation, but, by being condensed on the skin, tends to decompose it, and thus render it's protection less effectual. This happens to a greater extent in apples and pears with smooth and glossy skins, than on those russeted varieties, whose thick, rough skins are less perfect conductors of heat, which may account for the well-known long-keeping of the russet apples. The moisture produced by condensation from the air must not be confounded with that caused by sweating when the fruit is placed in large masses soon after being gathered. When the air becomes colder than the fruit, evaporation takes place, and the surface becomes dry; and these alternations of moisture and dryness, like those of heat and cold, are injurious.

Having determined the conditions necessary to the ripening and preservation of fruit, we have now to apply these principles to the construction of a fruit house. Passing by the costly patented methods which have been tried and condemned, or which, though correct in principle, are not yet practically tested here, let us consider what may be better adapted to the wants and means of the fruit-growers of Essex County.

Security against frost is the first requisite; for if our fruit ripens prematurely we have only to eat it sooner, but if frozen it is utterly worthless. Where, as in this climate, the mercury sometimes falls to twenty degrees below zero, to afford certain protection against frost, the walls should not be less than three feet in thickness, filled with dry tan, sawdust or other non-conducting material; or they may be made with two walls, each one foot thick, filled with tan, &c., with an air-space one foot wide between. The top and bottom should be built in the same way as the sides, and the bottom made impervious to the moisture arising from the earth; or, better to secure this end, the room may be in the second story of a building. The roof may be of the ordinary description. There should be but one entrance with double doors, six inches thick, filled with tan. The window should not be larger than is necessary to admit the light requisite in stowing and examining the fruit. It should be double, and protected by an outside shutter constructed like the doors; and both doors and windows should be tightly fitted. Or perhaps it would be better to omit the window and use only artificial light, which is less stimulating than sunlight.

Such a house, when once brought to a proper temperature, will, when closed, retain it for a long time, and never can change it suddenly. Moisture arising from the fruit may be removed by means of chloride of calcium, which possesses the property of absorbing twice its weight of water. It may be spread on the floor or in shallow pans, and when it becomes liquid can be dried over the fire so as to be fit to use again. The entrance should be through an ante-room, in which the fruit may be sorted and arranged, and if the quantity is large, it would be better to divide the house into two or three apartments for the earlier and later ripening fruits.

It is evident that security from frost might be obtained at much less expense by constructing the fruit-room in a cellar. The object of building it above ground is to avoid the warmth and moisture arising from the earth; but I believe that when a cool, dry cellar, on the north side of a building, can be obtained, it will answer every purpose so well that it would not be worth while to incur the additional expense of building above ground.

It should be provided with ventilators on the north side; but these should be opened only when the air is cool and dry. The floor should be cemented to avoid vermin. A cellar under a barn or other outbuilding would be preferable to one under a dwelling-house; or, if obliged to use the latter, it should be rendered independent of heat from above by a non-conducting top, formed by one or two thicknesses of lath and plaster, with air-spaces between, or by filling between the timbers with tan. Similar partitions should separate it from other parts of the cellar. If circumstances necessitated a situation less dry than is desirable, this might be remedied by tight lining of boards on the bottom and sides, with air-spaces of three or four inches between the lining and the floor or walls, or the dampness could be removed by the chloride of calcium.

It will be found that some specimens of fruit will keep much longer than others of the same variety; those from an old or unhealthy tree, or from a warm soil, will generally ripen earlier than those grown on young and vigorous trees, or on strong and colder soils. Before being finally placed in the fruit-room, they should be carefully assorted, and those likely to ripen first deposited by themselves. A little experience will enable the cultivator to do this. There is a kind of fungus, having the appearance of black spots, which should be especially thrown out, for it is contagious, spreading rapidly in a warm barrel, and communicating a bitter taste to the fruit. It has been recommended to pick fruit only when cool, avoiding the middle of the day; but this would reduce the working time so as to cause great inconvenience where there is much to be gathered, for all agree that it must not be picked with the dew upon it, and it is not easy to see why fruit cooled on the tree should keep better than that cooled in the house. It will be found a good plan to gather fruit after the middle of the forenoon, when the heavy autumn dews have dried, and devote the morning to sorting and arranging what has been picked the day before.

The most critical time in the management of winter fruits is during the beautiful, warm, damp Indian summer days of October and November. They will then need special attention to maintain a cool, even temperature, and prevent the deposition of moisture.

The fruit should be placed in tight boxes or casks. It is best not to put more than two layers of pears in a box, for the pressure of the superincumbent fruit not only disfigures that below by flattening its sides, but may even rupture the vessels and cells and thus cause decay. All boxes, casks, &c., must be perfectly sweet, clean and dry. If flour barrels are used, they should be thoroughly washed and dried; for the flour which remains after the most careful brushing is certain to mould with the least moisture. When filled, the packages should not be moved more than is necessary, and then gently and carefully. All decayed specimens must be immediately removed, and no vegetable or other matter which would produce unpleasant odor should be allowed. A fruit-room should not be otherwise occupied; frequent opening and shutting produces injurious changes.

If it is desired to use fruit before it would ripen in the fruit-room, it may be placed in a temperature of from 55° to 70°, when it will mature in one or two weeks; but it must not be exposed to the air. The flavor will not be improved over those ripened in the cooler atmosphere of the fruit-room, except it may be in the case of a few varieties, such as the Vicar of Winkfield, which is thought better when ripened in a warm place. The Easter Beurre and Chaumontelle have been found to be improved by a somewhat changeable and moist atmosphere; but these are exceptions to the general rule. Other kinds, such as the Bergamotte Fortunee, which, in the more moderate heat but longer seasons of Europe, are good dessert pears, under our fierce suns and shorter seasons fail to acquire such a degree of maturity on the tree that with the utmost care in the fruit-room they can be rendered melting. Others, like the Josephine de Malines, though difficult to ripen when grown on young trees, mature easily as the trees attain age.

In considering this subject, I have had the pear chiefly in mind, for the obvious reason that it is the most difficult fruit to preserve and ripen, and that whatever conditions will affect this, will certainly preserve and ripen apples.

The cultivation of the grape has, during the last ten years, increased with a rapidity unparalleled in the case of any other fruit, and is destined to still further extension. It is extremely desirable to prolong the season of this fine fruit through the winter, and this may easily be done by placing them on shelves in a cold, dry closet, with a thickness of wadding over them; or in not more than two layers in shallow boxes in the fruit room, with a sheet of soft paper between the layers. They must be sound and well ripened, and all unripe, imperfect, bruised, or decayed berries must be carefully removed. Varieties with a thick skin are preferable for keeping, and among these none have succeeded better than the Diana.

Although the term "preservation" can hardly be applied to the ripening of summer fruit, it is so closely connected that a few remarks on that subject may not be out of place. It is now well known that almost all summer pears, to be eaten in perfection, must be ripened in the house; the exceptions to this rule are the Roussetet family, of which the Rostiezer is the only one generally cultivated. The property of ripening in the house is a most valuable one, for the fruit, gathered from one to two weeks before it will be in use, can in the mean time be transported hundreds of miles to distant markets; and the waste and trouble are far less when the whole crop is gathered at once, than when it must hang to be picked as it ripens. The direction commonly given for gathering summer fruit has been to pick when it could be detached by merely lifting; but if we follow this rule our fruit will remain on the tree too long; it should be gathered as soon as it can be perceived that its hold on the branch is loosened. The flavor and color are brought out best when a considerable quantity is ripened together and in darkness and exclusion from the air, and the ripening is hastened by warmth and retarded by cold. The difference between pears ripened in the house and on the tree is so well stated by Mr. Barry, that I quote his words: "The process of ripening on the tree, which is the natural one, seems to act upon the fruit for the benefit of the seed, as it tends to the formation of woody fibre and farina. When the fruit is removed from the tree at the very commencement of ripening, and placed in a still atmosphere, the natural process seems to be counteracted, and sugar and juice are elaborated instead of fibre and farina. Thus, pears that become mealy and rot at the core when left on the tree to ripen, and are pronounced worthless, become juicy, melting, and delicious when ripened in the house." The formation of woody fibre is especially noticeable in the

Paradise d'Automne and Onondaga pears, when left too long on the tree.

The majority of apples are better house-ripened, but the Early Harvest, Red Astrachan, Williams Favorite and Gravenstein, should be allowed to hang on the tree until they drop.

Early peaches, to be in perfection, must be ripened on the tree ; but the latter kinds, ripening after the 25th of September, may be picked without injury, but rather benefit a week or ten days before ripening ; and some kinds, which are apt to be dry and pasty, are improved as much as pears.

To sum up as concisely as possible the conditions necessary for the preservation of fruit, they are—well grown, sound specimens, uniform exclusion of light, air, and moisture, and as low a temperature as possible without freezing. The simplest method of fulfilling these conditions is the best.

Our knowledge of this subject is yet very imperfect, and all who experiment upon it should accurately record their attempts, whether successful or otherwise, for their own benefit and that of the public, so that we may ultimately attain to a full understanding of its principles and methods. I would also urge upon cultivators the importance of originating from seed, either hybridized or carefully selected, new varieties of winter pears, which can be kept and ripened with less trouble and care than those we now possess. The successful experimenter would be well repaid, both pecuniarily and in the consciousness of having conferred a rich boon upon his fellow-men.

APPENDIX.

ANNUAL REPORT

OF THE

TRUSTEES

OF THE

MASSACHUSETTS AGRICULTURAL COLLEGE.

1867.

To the Senate and House of Representatives in General Court convened.

In accordance with the requirement of the Act incorporating the Massachusetts Agricultural College, that "the corporation shall make an Annual Report of its condition, financial and otherwise, to the legislature," the Board of Trustees submit the following Report:—

The Annual Reports of 1865 and 1866, set forth with sufficient fulness the organization and general plan of the Agricultural College.

The governor of the Commonwealth, the secretary of the Board of Agriculture, secretary of the Board of Education, and the president of the College, are *ex-officio* members of the Board of Trustees.

The remaining members of the Board are Marshall P. Wilder, of Dorchester; Charles G. Davis, of Plymouth; Nathan Durfee, of Fall River; Henry Colt, of Pittsfield; Charles C. Sewall, of Medfield; Paoli Lathrop, of South Hadley; Phineas Stedman, of Chicopee; Allen W. Dodge, of Hamilton; George Marston, of Barnstable; William B. Washburn, of Greenfield; Henry L. Whiting, of Tisbury; D. Waldo Lincoln, of Worcester; Henry F. Hills, of Amherst; E. Francis Bowditch, of Framingham.

On the 29th of September, President French resigned his office, and Professor P. A. Chadbourne, of Williams College, was, on the 7th of November, elected in his place.

The time has now come when it seems demanded that a definite plan of action should be presented to the legislature, not only to meet the requirements of the law, but also that those who desire the advantages of the College may understand the facilities it will offer for education.

PLAN OF STUDY.

According to the regulations already adopted for admission to the freshman class, students must be prepared to pass the examination required for entering the normal schools of the State.

The subjects required to be taught in the College were also given in a former report. The present plan, therefore, simply arranges the studies, giving to each what is thought to be its proper place in the course. Undoubtedly, experience will suggest improvements, changing the relative place of studies here mentioned, introducing others, and perhaps striking out some now required. The object aimed at in the instruction is, first, to make intelligent, thoroughly-educated men; and secondly, to make practical agriculturists. This is demanded by the law of Congress donating the lands, which declares the purpose to be, "*to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.*" It is difficult to see how an agricultural education alone would meet the requirements of this law if such an education were desirable. But any system that attempts to give practical knowledge without first having given a broad scientific basis, will succeed only in making skilful artisans, and will not send forth men fitted to improve themselves, or add materially to the advancement of knowledge.

The course of instruction is necessarily somewhat modified by the condition of our schools. If all the children in the State could have the advantage of our best High Schools, the studies of the College course might commence one year in advance of what they now can. The College must raise its standard just as rapidly as it can be done without shutting out those who most need its advantages.

If any are now able to have at home the advantages offered by the College in the first year, such students can enter in advance, while the College should offer instruction to those who must go from home, at a less price than it can be obtained for in any other place.

It is proposed that, for the present at least, the instruction shall consist of two courses: a special course of lectures, exclusively agricultural, to be given every winter, and also a regular four years' course of study that shall give a truly liberal education—a basis for the active duties of life, which any citizen of a free republic may be called upon to engage in. The College will thus offer the advantages of a professional school in agriculture, and an educational course differing from that in the other colleges of the State, but no less extensive and thorough in its requirements.

Instruction in the regular course must first be given mainly by permanent professors of the College ; but in the special courses, it is intended to bring in as lecturers gentlemen connected with other institutions, who have made certain subjects connected with agriculture their special study ; and also to bring in prominent agriculturists to lecture upon those subjects that have been of special interest to them. The College will thus bring before its students the best instruction that can be given by scientific men and the practical agriculturists of the State. We need all the aid we can command in such a new and almost untried enterprise as this, and we know of no better way to secure it than this which we have indicated. We see no better way than this to secure the practical element which it is desirable to have prominent in the instruction of the College ; and in no way can abstract science be more rapidly advanced than where the suggestions which have come from study in the laboratory and cabinet can be tested at once by the observations and experiments of practical men, who are thus enabled to turn to good account the accumulated experience of a lifetime, which otherwise might be of no advantage to others. The first work of the College in aid of agriculture will be to put in practice the best results which have already been worked out by our leading agriculturists, before it will be in a condition to enter upon new experiments.

The following is the course of study proposed for both the regular and special departments. Such explanations are added as will show as nearly as can now be done what the work of each year is to be.

1. Special Course.

Lectures commencing with the Spring Term, embracing in part the following subjects ;—

Structural Botany, Propagation and Cultivation of Plants, History of Cultivated Plants, Pomology, Practical Agriculture, Agricultural Chemistry, Physical Geography and Surface Geology, Natural History of Domestic Animals, Comparative Anatomy, Diseases of Animals, Milch Cows and Dairy, Sheep Husbandry, Insects injurious to Vegetation, Fuel—its origin and preparation, Rural Architecture.

A portion of these lectures will be delivered by the president and professors of the College. But among those who have promised their aid in carrying on this course are Hon. Marshall P. Wilder, D. George B. Loring, E. W. Bull, Esq., and C. L. Flint, secretary of the Board of Agriculture.

This course of lectures will be especially for the benefit of those whose circumstances are such that they can devote but a short time in winter to study. It is but extending and rendering more complete the plan of the Board of Agriculture, in holding yearly meetings for lectures and discussions. While these lectures will not take the place of the regular college duties, the arrangement of the lectures and college studies will be such that students who remain three years in College, will be able to hear all the lectures of the special course.

2. Regular Course.

Freshman Year.

First Term.—Algebra; English Language; Human Anatomy; Botany. Lectures on the Preservation of Health and Methods of Study.

Second Term.—Geometry; Drawing; French; General Chemistry and Mineralogy. (Recitations and Lectures.)

Third Term.—Geometry; Drawing; French; General Zoölogy; Botanical Analysis.

Members of the Freshmen Class will be allowed to attend at least one lecture daily, of the special course, on Agriculture, in such departments as the Faculty shall determine.

Sophomore Year.

First Term.—Trigonometry; Surveying; Mensuration; Agriculture; Physical Geography; Applied Chemistry and Mineralogy. (Recitations and Lectures.)

Second Term.—Analytical Geometry; German; History. Farm Management by lectures; Book-keeping and Farm Accounts; Laboratory Practice.

Third Term.—German; Comparative Anatomy; General Geology; Landscape Gardening and Rural Architecture.

Lectures.—Diseases of Domestic Animals; Physical Properties of Soils; Drainage.

Students of the Sophomore Class will be allowed to attend one lecture daily of the special course, on such subjects as the Faculty may determine.

Junior Year.

First Term.—Mechanics and Optics; Political Economy; English, French or German Literature or Calculus, (optional.)

Lectures.—Horticulture; History of Useful Plants.

Second Term.—Engineering; Hydrostatics; Analytical Chemistry, Laboratory Practice; Forestry; Industrial Statistics.

Lectures.—Magnetism and Electricity.

Third Term.—Astronomy, Climatology; Animal and Vegetable Physiology, with special reference to Breeds and Varieties; Rhetoric; Laboratory Practice.

Lectures.—Entomology, Bee Culture, &c.

Students in the Junior Class will have the privilege of attending one lecture daily, of the special course, on such subjects as the Faculty shall determine.

Senior Year.

First Term.—Civil Polity; Intellectual Philosophy; Economic Geology and Mining.

Lectures.—Law relating to Rural Affairs.

Second Term.—Moral Philosophy; Logic; Æsthetics; English Literature.

Lectures.—Architecture.

Third Term.—Special Subjects; Reviews.

Seniors attend any lectures of the course.

Military Tactics; Declamations; Discussion and Themes during the whole course.

The first term of the College will commence October 2, 1867. The first year provision will be made for a freshman class only.

Those students who complete the whole course will be entitled to the degree of Bachelor of Science; and those students who make special proficiency in any department, beyond what is required in the college course, without neglecting the required duties, will, on examination, be entitled to a special diploma in that department.

Persons not proposing to graduate may enter at any time and select any two studies which they are fitted to pursue, and attend any lectures of the course. Such students must conform to all the college regulations binding upon students of the regular course.

The laboratory and field practice will be under the direction of the professors of the several departments, and will be carried on for the purpose of instruction alone. No natural science can be learned by the mere study of books. There must be work in the laboratory, in the cabinet and in the field. This principle now recognized in most of our colleges and scientific schools, will be made prominent in all the departments of this College. A well cultivated farm will at all times furnish illustrations in Agriculture. A botanic garden, with green-house, graperies and propagating houses will be an invaluable aid in the study of Botany and Horticulture.

College Buildings.

A college must have recitation and lecture rooms convenient for the purposes of instruction, and when a college is fully organized no small amount of accommodation is required for cabinets, library and other appliances required in giving a thorough education. Some provision must also be made for rooms and board for students. When students can be accommodated in families, that is the best that can be done for them. But this method of rooming and boarding is always expensive, and if an Agricultural College is situated so as to have a large farm connected with it, there will seldom be found families enough within a reasonable distance to furnish rooms and board for students at such prices as they can afford to pay. Certainly, as this College is located, there seems to be an imperative demand that some provision should be made for the students, both on the score of convenience and economy. Because students are better off in families than in any other place, it does not follow that they are better off distributed in small club houses where there are no families, than they are in a college building of the ordinary kind. The Trustees must furnish the best accommodation possible with the means at their command.

In the plan adopted they have contracted for such buildings as will always be needed for the College. And while these buildings are by no means all that will ultimately be required for the greatest efficiency of the institution, they will be sufficient for its accommodation, until it shall be better known than it now is, exactly what is needed, and until the College shall be shown to be worthy of the patronage and support of the public.

The following buildings are already contracted for at the prices named, the work to be completed by the first of August of the present year.

1. A dormitory 100×50 feet, four stories high. The three upper stories of this building will afford ample rooms for forty-eight students, leaving the entire lower story for recitation rooms, a cabinet and library room. Whenever a building shall be erected giving more ample accommodations for lectures, recitations, cabinets and libraries, this lower story can readily be used for students' rooms. The cost of this building, according to contract, is to be $30,000.

2. A laboratory 46×57 feet, two stories high. The lower story contains a room for chemical analysis, with furnace room, apparatus room, and balance room attached. The upper story contains furnace room, three apparatus rooms, and a large lecture room which can also be used as a chapel. Cost, $9,350.

3. A boarding house, where board can be furnished for fifty students. Students will board wherever they choose, but this house is built for the purpose of securing to such as desire it, board at cost within a convenient distance to the College. Cost of the building $5,050.

It is estimated that $46,000 will cover the entire cost of these buildings and such out-buildings as are required for them.

This will leave $33,429.34 of the building fund for repairing the buildings now on the farm, erecting new farm buildings and a president's house.

INSTRUCTION.

Some account has already been given of the proposed method of giving instruction in the special course.

In the regular course, the College must commence with a single class and at first will have no need of a full corps of instructors. The instruction in chemistry and natural history for the first year will be given by the president. For the other departments ample provision will be made before the opening of the collegiate year.

The Hon. Levi Stockbridge has been elected Farm Superintendent, and will enter upon the duties of his office the coming spring. The farm will then, as soon as possible, be brought into a state fitting it for the purposes of instruction in practical agriculture. In addition to such field work as may be required under the direction of the several professors for the purpose of instruction, those students who choose to employ a portion of their time on the farm will be encouraged to do so under the direction of the Farm Superintendent. For such labor a fair compensation will be given. But as the purpose of the College is instruction, mere labor for pay will not be encouraged or allowed to such an extent as to interfere with the regular and successful performance of all required college duties.

Botanic Garden.

With the limited means derived from the college fund, no outlay on the land could be made except such as should be demanded for the general cultivation of the farm. But the Trustees are able to make the gratifying announcement that $20,000 have already been pledged to the College for the express purpose of establishing and maintaining a Botanic Garden. Ten thousand dollars of this fund are given by Messrs. Leonard M. and Henry F. Hills, of Amherst, and ten thousand by Dr. Nathan Durfee, of Fall River. These liberal subscriptions, so promptly made for this purpose, render it the duty of the Trustees at once to undertake the work on a scale that shall correspond to the generous intentions of the donors, and make the garden an honor to the State. We have no doubt others will willingly aid in carrying out a plan that shall secure to the College all that can be desired in this direction. The whole subject has been referred to a committee of the Board, to report upon a plan of organization, so that the work of preparing the ground for the garden may be commenced the coming spring.

Relations to Amherst College.

The people of Massachusetts, through their representatives, were emphatic in their decision that the Agricultural College should not be merely a department of some already existing institution. A fear has been entertained by some that its location near another college is an unfortunate one. We think any apprehension on this score is entirely without foundation. Certainly there are some great advantages in its proximity to an old established institution. The very liberal offers made by Amherst College in regard to the use of its library, give the students of the Agricultural College advantages which they could not have for many years from the institution itself. The very extensive and valuable mineralogical and geological cabinets there will always be open to our students, so that there will be no need of attempting to build up such cabinets in connection with the Agricultural College. With these cabinets so near and so valuable—but valuable to students only for general examination—it would be a mere waste of money to do more than to prepare cabinets for illustration in the lecture room, and make collections in those departments having special reference to agriculture. This method of action ought to be more generally adopted than it is, even by those colleges far from each other. If each one would provide itself with specimens needful for class instruction, and then complete its collection in some department not well represented in other cabinets, we should have far better results for science than we do when each institution strives to build up its cabinets in all directions without any reference to what can be found in a neighboring institution; or, if it has any reference, it is simply to duplicate the specimen instead of supplementing it. It is not too much to hope that the day will come, when for certain purposes, all the institutions of the State will be bound together in a university system, so that each may do its appropriate work and avail itself of the work done by other institutions, whether near or far from it. We have no doubt there will yet be much greater concert of action among our institutions, even without change of location. Whatever disadvantages may be alleged from the location of the Agricultural College, it certainly has great advantages from its nearness to another institution which has around it expensive libraries and cabinets which need not be duplicated. In time a full return will be made to Amherst College in the Botanic Garden and other facilities for certain scientific studies which it is now in no position to command for itself.

While it is highly desirable and expected that the Agricultural College shall have its own corps of professors devoted to its work, it is not easy to select at any time a body of men fitted at once for the several departments. And, especially in the beginning, the full amount of labor in some professorships will not be required. In some departments only a small amount of time is ever required in a single year. It will not be merely a matter of economy, but an advantage to the institution in other respects, for us to be able to avail ourselves to some extent of the services of gentlemen connected with the other college. It is easy to see that the two institutions may be of mutual benefit to each other, while each goes on performing its distinct work.

Cost of Education.

It is the policy of Massachusetts to bring education within the reach of all. This may be said to be the aim of our American college system. The best colleges receive from their students only a small part of the money which is annually expended for their benefit. Grants from the State and donations from liberal benefactors have put our colleges into such a position that they can offer to the poorest, for a mere nominal sum, such advantages that no favored class in the land can secure better.

Every year are found in them, struggling side by side, the sons of the rich and the poor. This is as it should be, and shows our colleges to be truly democratic institutions. But the support of the student while obtaining his education has become so expensive within the last few years, that it is to be feared that a large class of most worthy young men will be deterred from undertaking an extended course of study. It is the desire of the Trustees to do everything in their power to diminish the expenses of the students who may become connected with the Agricultural College. For the present the price of tuition is fixed at thirty-six dollars a year, and room rent in the college building at fifteen dollars. Board in the club-house will be furnished at its actual cost, reckoning nothing for rent of building. It would be desirable for still further provision to be made to diminish expense. This can be done by the establishment of scholarships and by donations for founding professorships, and other purposes. It would be very appropriate for every agricultural society in the State to have at least one scholarship at its disposal, to be awarded by examination of applicants for the place. The candidates might be restricted to those who proposed to devote themselves to agricultural pursuits within the limits of the society. It might be the means of saving to us as agriculturists some of the young men who would otherwise leave the State. It would secure to each section of the State a few thoroughly educated farmers, who could not fail to exert a beneficial influence on the farming interest of their portion of the State. They would be able also to render important assistance to the College and to the Board in making experiments and recording reliable observations in the different counties, thus bringing out results which could not possibly be reached by experiment in any one portion of the State. We can hardly think of a more honorable and inviting field of labor, than those young men will occupy who thus fit themselves to become leaders in developing this great interest, either as practical farmers, or as teachers in the agricultural schools and colleges which are springing up in almost every State.

And before our College has a body of alumni to care for its interests, we must look mainly to the Board of Agriculture, by which the College ought to be " connected with every farm in the State." With no special effort, every agricultural society in the State might in a single year, secure a scholarship for itself, and do so much towards permanently diminishing the cost of education for a student of its own choice.

FINANCIAL.

An account of the expenses of the institution will be found in the Treasurer's Report, and the general condition of the funds for building and support of the College is presented in the schedule appended to this Report. The Trustees will be called upon to be pay $600 towards the expense of the new county road just completed through the College grounds. There are also a few other unadjusted accounts of small amount.

The treasurer of the Commonwealth reports the whole amount received by him from sale of land scrip to be $83,673.00. From the income of the funds in his hands $4,408.20 have been taken to pay premium on stocks bought, that the principal might remain undiminished. Of the net income of the land-scrip fund the College is entitled to two-thirds and the Institute of Technology to one-third. The net amount of income remaining in the treasury to the credit of the College at the close of the year 1866, was $8,935.03.

But by the provisions of the Act of May 11, 1864, granting $10,000 to the College, this sum was to be repaid to the Commonwealth, from the income of the land-scrip fund belonging to the College. If the provisions of that Act are insisted upon by the Commonwealth, it will absorb all of the income of the fund belonging to the College for 1864, 1865, 1866 and $1,064.97 of the income of 1867. The reasons why this repayment cannot legally be made have been fully set forth in former reports. The attention of the legislature is again respectfully called to this subject.

The whole amount of scrip granted to the Commonwealth was 360,000 acres. One-tenth (36,000 acres) has been sold for $29,778.40, and that sum has been paid to the treasurer of the College for the purchase of land. Of the remaining nine-tenths, 219,520 acres remain unsold.

Conclusion.

It is unfortunate for the College that its organization has been so long delayed. Difference of opinion in regard to location of the buildings has been misunderstood as a difference of opinion in regard to the method of organizing and conducting the institution. Undoubtedly there is a difference of opinion as to what the College should be. In reference to some of our best institutions that have been established for more than a century, there is a marked difference of opinion among their alumni and officers as to the most desirable organization for them now to meet the demands of the present time. As no one can claim to have experience in conducting such an institution as this, it would seem to be the wisest way for all well-wishers of the College to go on as best they can in the light of experience gained in the general work of education, and be ready to adopt such changes as the practical working of the institution shall show to be necessary.

The fear is expressed by some that, if an attempt is made to give a truly liberal education, the students will turn aside from agriculture to other pursuits. Undoubtedly some of them will. If such an education is given in practical science as ought to be given in such an institution, there will be a demand for its students as teachers and in other professions. And it would be an education entirely unworthy of Massachusetts, and contrary to the plain intent of the Act of Congress donating the land, if it were so meagre in its requirements that the students should be fitted only for one pursuit in life. No surer way could be devised to defeat the very end for which the College was established, than to conduct it on a plan which proclaimed in theory and practice, that its students were to be kept in ignorance of certain things lest they should be above their calling. No institution can ever succeed on such a plan, and it ought not. It is difficult to see what a student would enter such an institution for. Such views are repugnant to every generous feeling which an educated man ought to possess, contrary to the principles of our institutions, and are not sustained by the present position of the agriculturists of this State. The adoption of such a system would be simply saying to the farmers of Massachusetts that they are tillers of the soil, because they are too ignorant for other pursuits. An entirely different principle has been acted upon in organizing the College. While the student is to be educated, agriculture, which rests upon a knowledge of all the natural sciences, is to be made a means of education. It ought to be so presented that it shall be an inviting pursuit for an educated man. When all its processes are scientifically understood, it will be difficult to point to any business or profession that offers a field of thought more desirable. The number of students will undoubtedly be small until the true position of the College is fully understood and it has established its character by the work it has accomplished.

The College will accomplish its design only by giving a sound education to its students and by aiding in the work undertaken by the Board of Agriculture, of developing the sciences of Agriculture and Horticulture in the State.

Respectfully submitted.

By order of the Trustees,

P. A. CHADBOURNE, *President.*

INDEX

TO THE ABSTRACT.

[For Index to the Report see end of First Part.]

Page.
Agricultural College, report of trustees of, 133, 143
Apples, 131
Ayrshires, 78

Barley, 55, 67
Barns, 10, 12, 15
Bone meal, 21, 55, 57
Bread, 119, 122, 124
Bulls, 77
Butter, 111, 112, 115, 117

Cabbages, 70, 72
Carrots, 56, 71
Cheese, 116
Construction of fruit houses, 124
Corn, 61, 64, 65
Cows, 77, 82
Cranberries, 74

Dairy, management of, 111, 115, 118

Farms, 1, 9
Farm buildings, 10, 13, 15
Farm accounts, 8, 9
Feed, 117
Flour, 120
Flour of bone, 7
Fruit, 124, 126, 131
Fruit houses, essay on, 124, 126, 131
Fruit trees, 28, 32, 38

Grain crops, 39, 46, 49, 61, 68
Grapes, 130
Grape vines, 39, 43
Guano, 7, 16

Hedges, 59
Horses, 90, 94

Indian corn, 61, 64, 65
Improvement of pastures, 16, 22

Jersey stock, 78, 80

Manures, 2, 16, 21, 50, 54, 58

Page.
Meadow land, 74
Merino sheep, 96
Milch cows, 77, 82
Milk, 83, 118

Nantucket stock, 79

Oats, 67
Onions, 56, 68
Orchards, 28, 32, 34
Oxen, 85, 89

Pastures, improvement of, 16, 22
Pears, 33, 35, 38, 129, 131
Potatoes, 2, 56, 72, 122
Poultry, 104, 109
Preservation of fruit, 124

Root crops, 68, 71
Rye, 16, 17

Sandy soils, 69
Sheep, 95, 101
Shorthorns, 77
Statistics, 6, 8, 24, 27, 48 118
Stock, 76, 80
Subsoil plough, 72
Swamp lands, treatment of, 22, 27
Swine, 102

Thoroughbred stock, 80

Unfermented bread, 122

Vinegar, 3
Vineyards, 39, 46, 49

Weld farm, 2, 4
Wheat, 63, 66
Wheat flour, 121
Willows, 59
Winter fruits, 129
Wool, 99
Working oxen, 85, 89

Yeast, 122

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